COMMUNITY FISH FARMING SYSTEM IN GONDA DISTRICT OF UTTAR PRADESH WITH SPECIAL REFERENCE ECONOMIC & PROBLEMS

THESIS

submitted to the

Bundelkhand University

For the Degree of

Doctor of Philosophy

in

Agricultural Extension

By

Kapil Deo Singh

under the supervision of

Dr. B.N. Tripathi

(Professor & Head)

Dept. of Agricultural Extension & Communication

Allahabad Agricultural Institute- Deemed University, Allahabad

(UP) India

Dedicated

To My

Beloved Parents

इलाहाबाद एग्रीकल्चरल इन्स्टीट्यूट–डीम्ड यूनिवर्सिटी
Allahabad Agricultural Institute-Deemed University
(A Christian University Of Rural Life)
Allahabad - 211 007 U.P. India

Office : 91-532-2684290, 2684284, 2684281
Fax : 91-532-2684593, 2684394
Website : www.aaidu.org
E:mail : registrar@aaidu.org

Dr. B.N. Tripathi,
(Professor & Head)
Department of Agricultural Extension & Communication,
Allahabad Agricultural Institute- Deemed University, Allahabad (UP) India
Consultant
National Institute of Agricultural Extension Management (MANAGE),
Rajendra Nagar, Hyderabad- 500030 (AP) India
Phone : 0532-2684444

Certificate

This is to certify that **Mr. Kapil Deo Singh** who has permitted to work for his Ph.D. Degree in Agricultural Extension of the Bundelkhand University, Jhansi on the problem entitled **"Community Fish Farming System in Gonda District of Uttar Pradesh with special reference Economic & Problems"** faithfully has carried out his research work under my guidance and supervision and that the accompanying thesis, which he is submitted, is his genuine work.

It is further certified that, (a) The thesis embodies the work of the candidate himself, (b) The candidate worked under my supervision & guidance for the period required as per claus-9 of Bundelkhand University Ordinance for Ph.D Degree, (c) Mr. Kapil Deo Singh has put in the required attendance during the period of study.

(Dr. B.N. Tripathi)
Supervisor

तार : विश्वविद्यालय
Gram : UNIVERSITY

टेलीफोन : कार्या0 : 2320496
कुलसचिव : निवास0 : 2321214
फैक्स : 0510– : 2321667

बुन्देलखण्ड विश्वविद्यालय, झाँसी
BUNDELKHAND UNIVERSITY, JHANSI (U.P.)

झाँसी (उ.प्र.) 284128

संदर्भ.....

दिनांक 20/04/07

Dr. Shishir Kumar Singh,
(Lecturer)
Department of Agricultural Extension,
Institute of Agricultural Sciences,
Bundelkhand University, Jhansi (UP) India

Certificate

This is to certify that **Mr. Kapil Deo Singh** who has permitted to work for his **Ph.D. Degree** in Agriculture Extension of the Bundelkhand University, Jhansi on the problem entitled "**Community Fish Farming System in Gonda District of Uttar Pradesh with special reference Economic & Problems**" faithfully has carried out his research work under ~~my~~ co-guidance and co-supervision and that the accompanying thesis, which he is submitted, is his genuine work.

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Shishir

(Dr. Shishir Kumar Singh)

DECLARATION

I hereby declare that the thesis entitled "Community Fish Farming system in Gonda District of U.P. with Special reference to Economics & Problems" submitted for the award of the degree of "Doctor of Philosophy" in Agriculture Extension to Bundelkhand University, Jhansi is an original work carried out by me under the guidance and co-guidance of Dr. B.N. Tripathi, Prof. & Head, Department of Agriculture Extension, Allahabad Agricultural Institute - Deemed University, Allahabad and Dr. S.K. Singh, Asst. Prof. Department of Agriculture Extension, Institute of Agricultural Sciences, Bundelkhand University, Jhansi (U.P.). The thesis submitted by me is not substantially the same as one which has already been submitted for a degree of any other academic qualification in India or abroad.

All the help, assistance and references taken from various sources have been duly acknowledged.

(Kapil Deo Singh)

Allahabad
26-03-2007

ACKNOWLEDGEMENT

Behind every success, there is certainly an unseen power of Almighty God, but an aim is the external condition of success, which is attainable at perfection in everything by those who presevere with association of the teachers, family and colleagues.

I wish to express my profound sense of gratitude and indebtedness to Dr. B.N. Tripathi (Prof. and Head), Department of Agriculture Extension & Communication, Allahabad Agricultural Institute, Deemed University, Allahabad (U.P.) and supervisor of my advisory committee for his keen interest, valuable guidance and vital suggestions throughout the course of investigation and preparation of this manuscript.

I am highly thankful to Dr. Shishir Kumar Singh (Asst. Prof.), Institute of Agricultural Sciences, Bundelkhand University, Jhansi for his visible guidance and valuable suggestion during my research work. I would like to exend my heartly regards to Hon'ble Vice-Chancellor of University for providing all sorts of facilities for carrying out the present investigation. I am also extremely grateful to teaching staff of Dept. of Agriculture Extension.

I am highly indebtedness and wish to express my deep sense of gratitude to Shri Brij Bhusan Sharan Singh, Hon'ble Member of Parliament, Balrampur and Founder & Manager of Nandini Nagar P.G. College, Nawabganj, Gonda.

I give special thanks to Dr. M.K. Singh, Head, Faculty of Agriculture and Dr. A.K. Mishra, Head, Dept. of Horticulture, Nandini Nagar P.G. College, Nawabganj, Gonda for their moral support and encouragement during my research work.

I extend my heartiest regards to all teaching staff of Faculty of Agricul-

ture, Nandini Nagar P.G. College, Nawabganj Gonda.

I wish a lot of thanks to my special friend and colleague Dr. Rajneesh Kumar Singh, Lecturer, Faculty of Agriculture, N.N. P.G. College, Nawabganj, Gonda.

I am overwhelmed to evince my profound sense of indebtedness to my beloved father Shri Bhagwan Bux Singh and mother Smt. Ram Piyari Singh for their love, affection, encouragement and moral support during the period of study.

I am also thankful and boundless affection to my elder brother Shri D.V. Singh and Shri V.P. Singh, bhabhi Smt. Madhavi Singh and Smt. Suchitra Singh, Nephew Aman, Raman, Sonu and Satyam, Sister Smt. Susheela Singh, Smt. Neeraj Singh and Smt. Renuka Singh, Bhanje Chotu, Betu, Parul, Vibhu and Sonali for their co-operation and help.

I wish to regard my appreciation and cordial thanks to my wife Smt. Neetu Singh (Rimpi) and my lovely son Ayush (Deva) for her encouragement and creating pleasant and joyful atmosphere during the cource of my study.

Besides these, I thankful all those who helped me directly or indirectly during the present endeavour. I do not list them all; it is not for lack of gratitude but for lack of space who compels me to hold my pen down.

Chaitra Ram Navami, 2007

(Kapil Deo Singh)

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❑

Chapter-I

INTRODUCTION

Our country is blessed with vast inland water resources in the form of rivers, estuaries, natural and man-made lakes, brackishwater, impoundments and mangroove wet lands. The length of coast line of India is about 8,041 Km. The inland water bodies are divided into five major riverine systems Ganges, Indus, Brahmaputra, East flowing riverine system and West flowing riverine system. Further, it has 2.25 million hectare of freshwater ponds and tanks, 1.3 million hectare of "bheels" and derelict waters, 0.12 million hectare of irrigation canals and channels, 2.3 million hectare of paddy fields and 1.41 million hectare of brackishwater and estuarine area. India's lakes and reservoir's area of 2.09 million hectare is expected to cross 3.5 million hectare by 2200. Such a vast water resource to offer, yet under exploited, could be wisely used to boast Indian economy to a great extent. Aquaculture stands as a plausible answer to it and India is all poised towards "blue revolution" (Pandey and Shukla, 2005).

Aquaculture is the scientific cultivation of all aquatic organisms for all over human benefits. It is practised in freshwater, brackish water and also marine water. It involves fin-fish culture, shell-fish culture, pearl culture and other cultures in aquation environments including algal culture for food and industrial uses, etc. Among all these fisheries accounts for 15% yet it deserves full credit along with prawn culture as far as Indian economy is concerned. Fisheries is practised through culture and capture. Of

these, culture fisheries alone contributes 1.3 million tonnes to the total fish production (Pandey and Shukla, 2005).

Indian fisheries till 1947 (the year of political independence) followed ancient modes and practices of fishing etc. with indigenous boats crafts and gears in the limited shore areas of the coastline. Most of the catches were sold locally. A small portion was only dried or salted and exported to neighbouring countries. Around 1950 India experimented with different advanced techniques for boosting the fisheries. Around 1960 India introduced mechanized boats, trawlers, more efficient nets like purse- seine, and chartering new fishing grounds in the Bay of Bengal and Indian ocean. Around 1970, the Indian sea—food industry emerged out successfully, ranking as the 7th largest country in the world. Also during 70s with the perfection of technology composite fish_culture and dedicated services of H. Chaudhury, K.H. Alikunhi, V.G. Jhingran etc., aquaculture practices in smalI tanks and ponds gained momentum. This technology has also influenced the utilisation pattern of the available water area. Most serious impact of this technology became more apparent in Andhra Pradesh, where about 75,000 hectare of low-lying areas and paddy fields have been transformed into smalI designed fish ponds. Potentially the inland fish resources of India are the richest in the world (Das, 1988).

Indian Institute of Management, Ahmedabad has estimated

that by the end of 2025, the domestic demand for fish in India is likely to be anywhere between 60 and 135 lakh tonnes/year. The marine fish catch can meet only half of this demand thus indicating a positive market trend for freshwater pisciculture. Similarly, in brackishwater, out of a total of 1.456 million hectare 0.902 million hectare is being utilised principally for shrimp farming by "trapping-cum holding" method, phenomenally being practised in the West Bengal and Kerala. The other states prominently engaged in this sector are Orissa and Andhra Pradesh. Relatively longer growing time, lower price in domestic market etc. are, however, the chief constraints to the adoption of brackishwater pisciculture (Pandey and Shukla, 2005).

The future potential of aquaculture industries in India is realised very well due to the fact that from Rs. 5.13 crore in I Five Year Plan, the total outlay has increased to Rs. 1172.32 crore during VIII plan (1992-1997). The development of fisheries sector gained momentum slowly but steadily by gradual step up of outlay from plan to plan. The I and II Five Year Plans were confined to efforts in collection and distribution of fish seed. Subsequently, greater emphasis was given to marine fisheries and most recently our policy shifted towards development of inland fisheries.

The role of fisheries sector in the country's economic development is amply evident. It generates employment for a large

coastal and other population, raises nutritional standards, increases food supply and earns foreign exchange. According to quick estimates of the CSO (Central Statistical Organisation), the contribution of fisheries sector to gross domestic product (GDP) in Rs. 10,693 crore (1.28% of total GDP) at current prices and net domestic product (NDP) has shown a fourfold increase from Rs. 1,478 crore in 1984-85 to Rs. 9,826 crore in 1995-96 (1.29% of total NDP) at current prices.

Fisheries in present economic scene is identified as the sunrise area that offers the scope of rapid growth for sustainable development. India is placed eleventh with a share of only 2% in the 45 billion global market. The current marine fish production of 2.2 million tonnes awaits a boost to 3.9 million tonnes. Similarly, the freshwater pisciculture, is expected to provide 5.0 million tonnes of fishes by 2025. The marine fisheries finds a growth rate of 4.32% in comparison to inland fisheries which is 6.25%.

Fisheries growth in India is essential to meet three major targets:

(1) Increase in production to meet protein requirements.

(2) Development of export potentials.

(3) Improving the socio-economic conditions of fishermen.

The fisheries sector is contributing to Indian economy mainly through following ways :

The per captia yearly consumption of fish has been 3.2 kg on an average upto 1992 (5.13 kg for fish eating population/year) as against the estimated requirement of 11.0 kg. Pisciculture has the potentiality due to its on-the-spot food characteristic, balanced nutrients and above all, affordable price.

Fish is considered rightly as the "poor-man's diet". It costs much less in comparison to its food value. It is an almost zero-carbohydrate food, good for diabetes and other such patients. Fish is a rich source of protein, vitamins and minerals with approximate composition as crude protein 14.2-22.8%, fat 0.6-2.4% and energy 76-161 Kcal/100 gm. A special feature of fish flesh food is content of vitamin B_{12} which is absent in plant food and also a good source of calcium and vitamin A. Fish also contains poly unsaturated fatty acids which are known to provide protection against cardio-vascular diseases. This has got advantages over the other flesh food like meat. Fish has a better biological value (BV) and protein efficiency ratio (PER) than other meat food. Fish has a BV, net protein utilisation (NPU) and PER (protein efficiency ratio) of 80, 74 and 3.5 respectively as compared to meat, which is (74, 76 and 3.2).

The monthly per capita consumption of fish in India was highest in Lakshadweep (3.38 kg) followed by Kerala (1.59 kg) and Goa (1.38 kg). It can be noted that per capita requirement is 12 kg as recommended by ICMR (Indian Council of Medical

Research) and assuming India's fish eating population till 2025 to be around 6.90 million, the requirement of fish will be around 8.2 million tonnes.

Fisheries sector provides employment to about 24 lakh full time engaged fishemen, and 36 lakh partially engaged fishemen. Around 10% of these are engaged in allied activities related to fishing, marketing, net ming, fishcuring and processing. The average gross income for all categories of farmers is Rs. 13,944/ha and 'Rs. 16,554/ha for small, Rs. 18,270/ha for medium and Rs. 19,049/ha for large scale farmers. For the country as a whole, the average net income is Rs. 9,076/ha (Jhingran, 1982).

Quick growth of fisheries has also created positive Impact on ancillary industries like packaging, cold storage and ice plants, transport by insulated vans etc., excluding net and other such materials manufacturing enterprises generating additional employment opportunities. Several externally aided projects are under-way which may provide employment to shrimp farmers and allied workers (Jhingran, 1982).

It is worth mentioning that, fish farmers, artisanal fishemen and fisherwomen engaged in fish culture, collection of fish seed from natural resources, fishing in closed and open inland and coastal waters, processing, transport and marketing etc. are the primary producers of the fisheries sector and as such they are the focal objects for sectoral development and welfare schemes

(Jhingran, 1982).

In last three decades fishery export has steadily increased from 16,377 tonnes, valued at Rs. 3.92 crore to 1,39,419 tonnes, valued at Rs. 893.37 crore. During the last three-four years particularly sea food export displayed a quantum jump of 50% by volume and 100% by earnings. Frozen shrimps accounts for about 70% of the foreign exchange earnings. Other items of export are frozen fish frozen lobsters and dried fish items.

India is endowed with innumerable small fresh water ponds, widely scattered all over the country. These small water bodies are utilised for multipurpose use like irrigation to agricultural fields, washing the catlle, domestic purposes and above all, the fish culture too in these days. In villages fresh water fish culture in community pond is livelihood of most families. The village panchayats started commercial fish farming in these community ponds. Some ponds were given under contract to the local people (preferably Mallah) and the rest were farmed by the village panchayat itself (Stephen and Kumar, 1996).

In Community Fish Farming System (CFFs) different communities participate in fish raising from single pond. Most of the farmers cannot afford all the items needed for raising fish. Therefore, they enter into joint ventures dividing the input required and profit made into shares.

One farmer rarely has sufficient money and labour to invest

in fish farming and therefore invites others to invest in joint ownership. Most shareholders in a particular pond are of the same family or community, resulting in maximum participation and allowing the benefits to be kept within the group.

In CFF system, most shareholding contracts are oral and the conflicts that arise from them are also resolved orally. They are not resolved by legal courts or agencies but by the shareholders themselves. Village elders and panch leaders may be called in to participate in finding a solution.

In community fish farming system (CFF) of Gonda district, farmers practised composite fish culture or mixed fish culture because this type of culture improved the production from the community pond. Composite fish culture involves stocking of compatible species of different feeding habits in order to utilise the food spectrum available in different ecological niches of the village community pond. The technology (developed in the seventies) has raised the national average to over 2 tonnes/ha/yr. from 50 kg/ha/year though, a harvest of 15 tonnes/ha/year has been demonstrated by the ICAR Scientists.

Gonda district has a large number of confined water area (perennial and seasonal) which offer good potential for fishery development. There is need to evaluate the economics of community fish farming system in the district and identify the major problems in CFF system so that suitable measure for its greater

adoption may be suggested.

Importance and Justification of the Work

Fish is a dynamic and renewable resource with considerable potential. It is also a very economical and rich source of animal protein.

Out of the 23% of India's total animal protein supplyin the diet, the fish amounts for a mere 2.3%, even when a widely variety of species contribute to the total production (ICAR now and ahead ... 1998).

Though aquaculture is an age-old practice in India, it received due attention only in the recent years. This may be due to revised Government policies in promoting aquaculture as a major industry.

Global demand for protein rich food is on an upward trend. Even among the proteinacious food items, people prefer food, which is of high quality protein, readily available to fit everybody's life style and budget.

In fulfilling the protein demand, aqua foods comprising of fish and fishery products play a remarkable role. The importance given to aqua food in the developing countries may be less due to their native food habits, but westerners will invariably have a dish prepared out of fish or other aquatic animals. The existing demand for high quality aqua foods in the developed countries

has forced farmers and entrepreneurs in developing countries to produce them at extra cost on otherwise.

For the poor and common man, fish is nutritionally imporant. It provides esily digestible protein, which has an amino-acid profile, particularly Lysine, not necessarily available from other proteins. Fish fat is rich in n-3 polyunsaturated fatty acids which have health benefits in protection against cardio-vascular diseases in development of brain and nerves, foetal and infant growth an also protection against diabetes, infections and even some types of cancer. Fish is also a rich source of Vitamins B_{12}, A, E and D. Fish also contains trace elements like Selenium, low sodium (suitable for people with blood pressure) and other minerals of nutritional significance like calcium, potassium, iron and copper etc. (Gopa Kumar, 1999).

On the basis of above discussion it is quite clear that the fish and its production is of utmost imporant and hence the significance of the present study in this remote area of Tarai belt of Eastern Uttar Pradesh.

Objectives of Study

On the basis of the above problem, the following spe cific objectives were frammed for the present study.

1. To examine the present status of community fish farming (CFF) practice that exist in the study area.
2. To study the physical status of community pond in CFF system of study area.
3. To study cultural practices/managemental aspects of CFF system.
4. To estimate the economic benefits to be derived from the CFF system on different size of fish ponds in the study area;
5. To estimate the input-out put ratio of different sizes of fishponds in the study area; and
6. To identify the major problem faced by fish farmer and their suggestive measure.
7. To study socio-economic status of fish farmer of CFF system.

Hypothesis

1. Tradional and conservative fish farming pratices are existing in the study area.
2. Success of fish farming is the source of encouragement to the local people to increased their additional income.

Chapter-II

REVIEW OF LITERATURE

Fish is the cheapest and best source of animal protein and other ingredients to supplement and balance the improverished diet of rural people. The under utilised and un-utilised rich resources of fresh water bodies both perennial and seasonal of our country is going to be the vital profit making ground for aquaculturists in the near future. There is tremendous scope for expanding and popularising fish farming. There is the crying need to evaluate the economics of fish farming, which will help in yielding a sizeable quantum of produce, which could well be sold in internal and external markets. The high profit margins, when compared to other farming practices will definitely encourage farmer to adopt this technology easily in every village and hamlet.

Fish production in India is mentioned in the records of Pal dynasty in Bengal (810-850 A.D.). Saneswara refers to two methods of culturing fish in a compilation of 1127 A.D.

'Aina Akbari' the official household manual of Emperor Akbar (11th Century) mentions numerious fish dishes for the royal dinner.

Fresh water aquaculture has been a traditional household practice in the eastern region of the country, with documented evidence even from 11th Century onwards.

Hora (1956) stated that the knowledge of the occurrence of fish in India dates back to three millennium B.C.

Some noteworthy contributions in thefield of community fish farming, their economics and related problems of fishermens are those of Alikunhi *et al.* (1971), Bailey (1980), Banerjee *et al* (1979), Chaudhuri *et al.* (1978), Dutt *et al.* (1989), Dawan *et al.* (1988), Kanaujia (1978), Lin (1970), Mathew (1979), Rout and Tripathi (1988), Soha *et al.* (2000), Selvaraj and Kanaujia (1979), Sharma and Mehta (1999), Singh *et al.* (2000), Sinha (1976) and Tripathi (1979) etc.

Dandyal and Singh (1968) studied benefit cost ration in fish culture and opined that fish cultivation was profitable to the extent of Rs. 2,300 per annum per acre under systematic cultivation. The profit margin of Rs. 349.56 was relatively low in natural fishery because of seasonal nature.

Chakravorty (1968) reached the conclusion that in higher number of shareholders the less is the sttention paid to the tanks as they faced with various maintenance and management problems. The shareholders, with small shares were hardly ready to spend for the develpment of tank although their expenditure was also proportionately small.

Webber (1973) in his study concluded that excessive inputs (fertilizer) to the ponds, which are not utilised by the fish, raise the expenditure of the experiment and also, add to the hig metabolic load of the ponds.

Sinha (1975) noted that an intimate relationship between

the input and output (the fish) prominent among which are the feed and fertilisers which account for the greatest part of the expenditure.

Bakar and Ashad (1980) indicated that small sized ponds are sufficient to generate supplementary income for farmers and ponds on a large scale could be used as a major occupation. Whatever the method of pond preparation, wages constituted more than 65 percent of total casts, while equipment and material constitute 25% and 10% respectively. Further more, increasing the size of ponds led to an increase in development costs of only 50%.

Ranadhir *et al.* (1979) stated in his paper non availability of fish seed of exotic carps in adequate numbers at reasonalbe price and in specific times poses a serious constrains in rural areas.

Rabanal and Delmendo (1980) in their study concluded that aquaculture as an industry. It is inherently manpower intensive, but not much power selective. Therefore, it canbe used to advantage in many populous developing countries where family labour, regardless of sex or age, can be utilised. This small-scale family venture in aquaculture can therefore, be a good source of additional income.

Sinha and Ranadhir (1980) pointed out certain constraints in the development of small-scale fresh water fish culture. The constraints are grouped into six major sections, viz. Basic inputs,

Social constraints, Legal constraints, Financial constraints, Extension gap and Lack of infrastructural facilities.

Kalawar (1981 a & b) carried out work on coastal and rural fisheries and their livelihood of fisherman of Thane district.

Valiakandalhil (1981) and Kurian (1989) studied the socio-economic condition of fisherman of Kerala.

Haque (1981) developed scale for measurement of problems as perceived by the farmer during his research work.

Tripathi *et al.* (1982) described concept of community fish farming in workshop on development of Inland Fisheries in Orissa through institutional finance.

Drews (1982) worked on the role and status of fisherwomen of Tamil Nadu.

Fermin (1983) in his paper "The Introduction of Integrated Backyard Fish Pond in Low Land Caivity" described that there is bright prospect for backyard fishpond operations in terms of providing fish protein, additional income and employment to the farm family. Fishpond operation can very well fit activity of small farmers.

Govind *et al.* (1983) reported that cost of production ranged from Rs. 0.34 to rs. 2.49 per kg in composite fish culture around Bangalore during 1981.

Haque and Ray (1983) reported that adequate exposure to

carp culture technology is important problem.

Tripathi (1984) stated that supplementary feed is the major cost component to the extent of 50-70% of total cost.

Lakshmanan *et al.* (1985) carried out an experiment in a pond (0.4 ha) belonging to less income group villagers at Pubasanan near Dhauli in 1979. The management practices including liming, fertilising the ponds with a mixed fertiliser and cowdung and feeding the fish with groundnut oil cake and rice polish. The harvesting the bulk of the stock through neting yielded a gross production of 2,000 kg/ha/6 months. The cost of production was Rs. 2.72/kg of fish harvested.

Moula *et al.* (1986) evaluated the economics of fish culture under different pond size in Bangladesh.

Rehman and Ali (1986) observed that average size of ponds in Bangladesh was too small for lucrative fish culture. Utilisation of fishery credit was not satisfactor, surplus fish were disposed of to local fisherman, non availability of good quality of fries (fish seed) from Government fish farms and lack of technical knowledge were major constraints on the pond owner.

Singh and Dhwan (1986) had conducted study on semi-intensive carp culture Regional Reserach Centre at a village in Ludhiana in a privately owned large (5 ha) pond during 1997-98. A production of 8 tonnes/ha has been achieved through phased manuring, bag feeding, bottom ranking, addition of fresh bore

well water and stock manipulation.

Pokharel (1987) attempted to analyse the nature and status of community fish farming (C.F.F.) in the Tarai region of Nepal with special reference to Bhawanipur and Hanuman Nagar village panchayats. The overall objective of the study was to trace a broad picture of C.F.F., which has been practised by local farmers for a long time. The study reveals that fish farming is characterised by low input and low output.

Islam (1987) described the major constraints upon pond fish culture in Bangladesh and include poaching, scarcity of piscicide, quality fry and credit, multiple pond use and ownership, over flooding and inadequate marketing.

Bhaumik *et al.* (1987) observed that non availability of credit is most important problem in fish culute in West Bengal.

Misra (1987) in his book assessed the operational features of fresh water ponds and tanks in the rural areas of Birbhumi and Murshidabad districts of West Bengal, socio-economic factors that impode the development of fish farming and the performance of relevent Government policies. It is noted that (1) the levels of production and productivity are not adequate; (2) New technology has failed to produce substantial results and (3) Production constraints included plurality of owner-ship of tanks and ponds, lack of quality fish seed, shortage of investment capital, inadequate extension network, poaching, deliberate poisoning and

inadequate organised marketing facilities.

Wadhwani and Broadway (1988) studied the achievements of F.F.D.As in Allahabad, U.P. The F.F.D.A. was established in 1978, with the aim of developing water resources in rural areas to improve the nutritional levels of the poor and generate employment. By the end of 1985-86, 775 ponds had been leased out, of which 60% incorporated improved practice and 40% did not improve due to lack of funds and the failure to secure loans for production and improvement costs.

According to Thakur *et al.* (1988) the activities of aquaculture in backyard pond generated income and provided employment for the rural women within the village.

Bhaumik *et al.* (1988) conducted a survey in ten districts in West Bengal to indentify the problem associated with the culture of exotic carps as perceived by the farmer. The study revealed non availability of credit (33.2%), lack of knowledge about the technology (16.7%), non availability of exotic carp seeds (16%), lower market (8.9%), non availability of aquatic vegetation for grass carp (7%), poaching (6.9%), lesser consumer preference (4.2%), poisoning of ponds (8.6%) and non availability of water bodies (3.5%) as the chief problems in the order of priortiy. The farmers also suggested measures like provision of credit, more exposure to modern technology, supply of exotic carpseed, production of fodder for grass carp, marketing through organised

sector and control of poaching and poisoning of the ponds for more effective diffusion of the technology.

Gangopadhyay and Giri (1990) had reported that fish production was more remunerative than crop production and was more capital intensive.

Suresh *et al.* (1990) made a survey on "An economic analysis of productivity in fresh water aquaculture in Madurai District" and found that level of fish production is generally low owing to sub optimal use of various inputs like seed, feed, fertilizer, labour management.

Bose *et al.* (1991) observed that gross return per hectare in case of large fish farmer (1-2 ha pond) is much lower than the small fish farmer (> 1 ha). The reason to be given to this fact is that the small fish farmers sale their catch on the spot and get a high return per kg. Medium and large size fish farmers sale their produce through the agent by auction and pay commission resulting in lower return per kg.

Chauhan (1991) in his paper "The Birth and Growth of Fish Farmer Development Agency" reported that establishment of F.F.D.A. in 5th five year plan, with the aim of extension of fish farming by utilising low lying areas and other unsuitable for agriculture has increased national average fish production from 582 kg/ha/yr in 1979-1980 to 1865 kg/ha/yr. in 1989-90.

Jhingran (1991) reported that F.F.D.A. function as autono-

mous bodies with a district as the unit base. The F.F.D.A. meets the basic needs of the fish farmers in respect of (i) technical support, (ii) extension support and (iii) financial support.

About 20,000 hectares of village ponds lying fallow have been brought under fish culture and about 90,000 farmers trained in composite fish culture by the 184 F.F.D.As (upto 1986).

Progress of fish farmers development agency in U.P. upto March 1986 is noted in his study where total number of F.F.D.As in Uttar Pradesh was 28,15,000 ha water area brought under fish culture and 13,750 number of fish farmers trained.

Radheshyam *et al.* (1991) were convinced that wide shade thrown by three over ponds render the pond water unproductive. Dropping of leaf litter makes the environment un-conducive for thriving of carps and the organisms that serve as food for the carps. Shading by tree is common problem in rural pond.

Majumdar and Haque (1992) have attempted a study in Nadia district of West Bengal to assess the relative cost and return from pond and field crop enterprises. The study indicates that the average cost and returns per hectare from fish production were Rs. 20,245.22 and Rs. 30,173.50 respectively and from field crop production were Rs. 10,774.94 and Rs. 12,195.60 respectively.

The return from ponds and field enterprises were positively and significantly correlated with the size of pond and operated

agricultural land. The results indicate that the pond crop cultivation is more profitable than that of field crop cultivation.

Jaynaman and Varadaraja (1993) analysed the economic of carp culture in Thanjavur district of Tamil Nadu. Report shows that farmers get only a net return of Rs. 2594/ha/yr.with an average production of 886.4 kg/ha/yr. Cost per kg of fish production was little higher and large fish farmers than small farmers.

Suresh *et al.* (1993) in their paper entitled "Economic analysis of fresh water fish culture in Kanyakumari district" has noted that farmers of Kanyakumari district of Tamil Nadu get only a net return of Rs. 2,614/ha/yr. with an average production of 920 kg/ha/yr.

Dwivedi (1994) reported that the Ministry of Agriculture (Fisheries Division) has liberalised support to fresh water and Brackish water through F.F.D.A's subsidy has been increased from Rs. 20,000 to Rs. 30,000 a hectare with a maximum of Rs. 1.0 Lakh per unit.

Fish Farmers Development Agency supports extensive aquaculture in village ponds and other remote areas. The average fish production is around 1,900 kg/ha/yr.

Anil *et al.* (1996) indicated that the major component of cost in case of culture fishery was the harvesting expenses which had a share of 32% of the total cost. The profit margin in capture fishery was more than those in culture fishing. It was found that

the fishermen were not following the recommended practices in fish culture.

Gaur and Khan (1996) described pisiculture plays important role in the socio-economic condition of tribal communities of N.E. region, but due to variety of problems, the region is not self sufficient in meeting total requirement of fish. Prime factors include non-availability of suitable ponds, seeds, funds, etc.

Misra (1996) made a survey on transfer of technology on pisiculture in Birbhumi district of West Bengal. Study reveals that the lack of finance was recognised as production disincentive by all operators. The operators also considered the non assureance of supply of quality fish seed at reasonable prices at the time of stocking as an important factor. Multiple ownership also emerged as a problem. High price spread and non retention of water throughout the year are also responsible for non adoption of modern practices.

Srivastava *et al.* (1996) pointed out seepage and percolation loss of water from fish pond has been a major problem in arid and semi arid regions. This is mainly due to low clay content, deeper water table and calcarious nature of soil. So there is a need to come out with measures which not only reduce the seepage rate out also maintain natural conditions.

Keeping this in view, an experiment was conducted using Bentonite, naturally occurring mont-morrilonite clay, in small

amount (5-10%) along with local clay and local soil. Lining of 15 cm puddled mixture of three components was able to reduce the water loss to manageable level in small pits. The water loss/ day was reduced to below 1 cm/day from 40 cm/day.

Singh (1998) in "Uttar Pradesh Newsletter" described role of F.F.D.As and narrated that at present the state government alone with F.F.D.As is providing following facilities to fish-culturists :

(1) Granting lease of ponds for duration of ten years for fish farming to those from fisher community.

(2) Providing loan of Rs. 82,000/ha with 25% subsidy for renovation of ponds to fish farmers.

(3) Providing shrot-term training programme on technical aspects of fish culture to fish farmers for a duration of 15 days and to provide training allowance at Rs. 25/day/farmer;

(4) Organising provision of loans at the rate of Rs. 12,000 per ha through nationalised banks to meet cost of first year inputs required for fish farming with 25% subsidy.

(5) Arranging supply of quality fish seed to fish farmers.

(6) Providing water and soil quality testing facilities free of cost to fish farmers.

(7) Extending technical assistance to fish farmers from time to time.

Radheshyam (1998) reported that adoption of fry and fin-

gerling production technology in villages is techno-economically viable for rural poor. The adoption of upgraded technology in rural area not only ensures production of adequate quantities of quality seed within easy reach of the farmers but it also generates better income and employment.

Singh and Sharma (1998) observed that total variable cost alone accounted for more than 85% of total cost in fish production. It was higher for large farmers (< 1 ha) (Rs. 3625) compared to small farmers (< 1 ha) (Rs. 2175). Among different variable cost items, the expenditure (per ha) on feed was the highest (23.16%) following by seed (23-14%) and instruments/fertilisers (20.33%) for small farmers, whereas for large farmers it was much higher for feed (59.38%), followed by lime (13.73%) and seed (4.26%). Net return was higher for large farmers (Rs. 59,745/ha) compared to small farmers (Rs. 41,910/ha). The production cost per kg of fish was Rs. 10.28 for large farmers whereas it was Rs. 9.24 for small farmers.

Total expenditure on various inputs e.g. seed, feed, fuel, fertilisers and labour etc. was Rs. 0.439 million. An amount of Rs. 1.088 million was realised through sale of 40.30 tonnes to fish @ Rs. 2700/tonne. Such a gross profit of Rs. 0.649 million was made from 5 ha (Rs. 0.130 million/ha) through semi-intensive culture of carps.

Das *et al.* (1999) in their study came to a conclusion that

extension gap as serious problem in development in aquaculture.

Des *et al.* (1999) reported that fish production from inland resources has recorded a ten-fold increase in the last four decades from 0.22 MT in 1949-51 to 2.44 MT in 1997-98, resulting in a growth rate of 5.06%. Share of Inland production out of total production has increased from 29% in 1950-51 to 45.50% in 1997-98. The present trend, however, is that there is a possibility of production going up from inland sector through aquaculture in the coming year.

Mukhopadhyay (1999) noted that waste water aquaculture mainly carp-culture has been proved as low input and economically viable technology for production of fishes as well as agri-horticultural products, mainly meant for small and marginal farmers.

According to Murthy (1999), the fresh water aquaculture has become a major economic farming activity in Andhra Pradesh, which stands as an example for the rest of the country to emulate. With innovative practices of feeding etc., production rate of 8 to 10 tonnes/ha/year have been achieved in Kolleru region as against the general average of 2 tonnes/ha/yr. Because of increased contribution from fresh water aquaculture, the inland fish production of Andhra Pradesh, as already stated, has increased from 1.05 Lakh tonnes in 1984-85, to 2.26 Lakh tonnes in 1997-98, while the corresponding increases were from 11.03 Lakh tonnes

(1984-85) to 24-38 Lakh tonnes (1997-98) for the entire country.

Rao (1998) reported that F.F.D.A. was introduced as a centrally sponsored scheme by the Govt. of India during the first five year plan period for promoting intensive fresh water and brackish water fish culture. It functions as an autonomous body co-ordinating the role and functions of the various Govt. departments, Financing Institutes and fish farmers in an integrated manner. The agency provides subsidies offered by the Government under the project and arranges credit from the Financial Institutes.

According to Reddy and Ayyappan (1999), another potential means for enhancing fish production during the coming decades appear to be in the exploitation of the genetic potentialities of our economically important species. Genetics have a potential role to play in aquaculture, the ultimate goal being to improve the per capita availability of fish protein to our masses.

Presently, the improved rohu is under field test in different environments spreading over the country. There after, an evaluation, it is proposed to relsease it for regular culture.

Saharan (1999) in this paper entitled "Status of Fisheries development in Haryana" has noted that Harayana is now well poised to reach new heights of achievements in fish and prawn production. It will soon emerge as one of the major fish producing states of India.

Suguhan (1999) found that community water bodies mostly found in Zimbanbwe, the north eastern Thailand, the north-eastern Brazil and some parts of Mexico, these are the most loosely organised fishery system often play a negative role in management. Many community reservoirs are legacies of the past and their fishery practices are deeply rooted to the customs and traditional values of local community. Recent efforts made in Zimbambwe and Brazil to develop a new participatory management system are worth examining. The attempt is basically to blend concept of equitable sharing of natural resources with that of conservation and sustainable development. In the process, the spirit of quity and democratic functioning are sought to be infused into the members of the community.

According to Gadhia *et al.* (1999) the fisher community in ara around Kakrapar Atomic Power Station, are part of the lower strata of the society. They are generally poor and are in a disadvantageous position in the society because of their economic backwardness, illiteracy and insignificant political attention and social institution, they remain indebted to private money lenders who advance money to meet their professional and other expenses.

Sadangi *et al.* (1999) conducted a survey of three village around Chilka of Orissa. The pilot study has also recalled that fishermen who come under scheduled caste category predominantly inhabit all the villages. The highest percentage (60%) of

fisher women is found in the age group of 35-45. Illiteracy is rampant among the fisher women, but 10% of the young fisher women have some primary education. They have a high level of credit seeking behaviour and about 80% of them are below poverty line. Discussions revealed that 10% of the fisher women could mobilise finance for their professional activities from non-institutional sources, like private moneylenders against different kinds of mortageges. It is seen that most of them are primarily involved in fishery activities (Fishig + fish trading 60% and aquaculture + fish trading 40%).

According to Ninawe (1999) the fish farmers development agencies (F.F.D.As) have played an important role in creating awareness among the fish farming community to promote integrated composite fish farming on scientific line. As on today, there are 414 F.F.D.As covering in 2.87 Lakh ha of water spread area under fish culture.

Bhanot *et al.* (1999) in their article "Fishery Technologies for Women" described that aquaculture is the emerging fisheries sector where women can benefit from the technology leading to their empowerment. Aquaculture is the source of self-employment in rural areas.

According to Gopa Kumar (1999) fish farming in India offers an income generating highly remunerative profession for youth. A 1 ha fish farm can give an average income of Rs. 5,000/

month in case of carp culture and Rs. 13,300/month in case of catfish.

For youth, a fishery is an expanding area of employment generation. It is also found that on an average for every one youth employed in fishing operation 4 additional persons are getting support employment through ancillary industry.

Vardia (1999) reported that small water bodies (village ponds) offer immense scope and potential for generating additional income and employment to an individual farmer, to a community.

Agarwal *et al.* (2000) reported that the local farmers of Garhwal Himalaya are gaining interest in fish culture practices by making small ponds in their agriculture fields but due to inadequate scientific knowledge, they are not getting significant profits. There is greater future prospect of cold water fish culture in Garhwal Himalayas.

Bandyopadhyay *et al.* (2000) demonstrated trials on carp culture in poly house pond in low temperature areas, where the metabolic activity is greatly reduced during winter there by affecting the fish production. Preliminary trials on carp-culture indicated that higher additional production levels of 114.4%-130.1% could be obtained in poly house pond compared to control ponds during winter periods.

Chakrabarty (2000) examined poetentiality of carp produc-

tion in sewage fed ponds. The growth rates of all the species (Catla, Rohu, Mrigal, Silver Carp, Grass Carp and Common Carp) and the yield were significantly higher in treated ponds than that of control pond.

De *et al.* (2000) collected data in Maharajganj and Barabanki districts of Uttar Pradesh. Extensive carp culture is adapted to a great extent in most areas (80%) and carps form the major produce (85%). Cattle dung, poultry litter, pig dung are the major manual inputs are rice bran, mustard oil cake, wheat bran, groundnut oil cake and soyabean meal are the important feed resources.

Sehgal and Sehgal (2000 a&b) found that the flood plain zone of Punjab (9-56 Lakh/ha in 1993) offers a great potential for aquaculture. It is possible to produce 3.5 to 4.5 t/ha/yr. of fish in traditional close pond system and 14 to 15 t/ha/yr. in partial flow-through system, developed at the Pubjab Agriculture University.

Rasheshyam *et al.* (2000) stated that community based aquaculture essentially offers enormous scope for commercial production of fish and also an easy access to fish for consumptive household needs. The impact of community aqua-farming on fish consumption by rural poor was investigated, involving 65 household during two successive years. First year Before Community based Aquaculture (BCA) and second year During Community based Aquaculture (DCA). The study revealed that overall BCA per capita fish consumption from the entire source

was 12.07 kg, whereas DCA per capita fish consumption was 26.24 kg exhibiting 117.4% increase. Community base aquaculture made a significant impact in ensuring the rural farmers' access to food fish in terms of quantity, quality and safety and thus providing food security.

Meeran (2000) wroked on socio-economic characteristics of fish farmers in Thanjavur district of Tamil Nadu. The study revealed that the fish farmers were literate with a majority belonging to young to middle age groups and backward community. They practised fish farming as primary/secondary occupations in addition to other occupation. Majority of farms ranged from 0.4 to 3 ha in size with bore wells as the major source of water. Direct sales to the public and vendors at the farm gate were the prefered marketing methods.

Bhatta *et al.* (2000) organised a study in Karnataka state. The study reveals that there is a vast scope of carp fish farming for realising additinal income and employment with minimum negative externality.

De and Saha (2000) conducted a study in Basudeipur, Orissa to identitfy the problems related to fish farming through farmer participation. Six key informants and a random sample of thirty farmers were selected for the purpose. Eight problems were identified, three of which were technology-related and the rest were infrastructural problems and suggestions were given.

Singh (2003) described about present status of fisheries and aquaculture as well as prospects for future development in Uttar Pradesh, covering various aspects like water resources, production, integration and transfer of technology to fish farmers. Chaturvedi (2003) reported about status of fisheries development in Uttar Pradesh and described about schemes being launched in the state through F.F.D.As.

Fish has long been an important source of food for people all over the world. The importance of the fish as a source of high quality balanced and easily degestible proein, essential amino acids etc. are well understood (Ayyapan and Venkateshwarlu, 2002).

Presently India holds third position in the world with a total fish production of 5.56 mmt in which marine sector contribution is around 2.81 mmt and from inland section it is around 2.84 mmt. The total report has reached a worth of Rs. 6643.00 crores. This huge production, consumption and export have made this sector an important part Domestic Product (GDP) is 1.4 percent (Ali *et al.*, 2003).

According to Panwar and Seth (2003) at present U.P. ranks sixth in inland fish production with total production of 2.08 lakh tonnes. It is also a fact that the inland capture and culture fishery resources of Uttar Pradesh are well known for their variety and production potential. ❑❑❑

Chapter-III

RESEARCH METHODOLOGY

This Chapter deals with the details of the study area, site of investigation, sampling techniques adopted during the study period along with analysis procedures used to find out the results of the study.

We have acknowledged certain limitations in the process of the present study which are limited to :

1. The area of investigation was restricted to villages of three blocks viz. Pandrikripal, Intiathoke and Mujehana. As such, generalisation of the study could be restricted to the area where similar conditions prevail.
2. The study was limited to the extent to which the respondents were able to understand and interpret questions and give answers correctly.
3. The extent to which research procedures are free from personal bias.
4. The extent to which the sample of the study is representative of the entire population.
5. As none of the respondents maintained the records of receipts and expenditures of farming, data were based on the memory of the respondents.

Level of agricultural production and nature of cultivation practices followed, varied with geographic location, market accessibility, education and technical know-how, and traditional

nature of the population. Therefore, primary data, such as cost of cultivation of fish under study, input-output behaviour in the fish production process, adoption of modern fish farming techniques per hectare productivity of fish in the study area were collected.

The Study Area .

Gonda is one of the district of Devipatan division of Uttar Pradesh, situated in the north-eastern Tarai belt of the Himalayas, between $26^0$41" to 27.51" north latitude and $81^0$30" to $82^0$6" east longitude. The district is covered by Nepal terrotory in north, in south the river Ghaghra separates it from Faizabad, Barabanki and Bahraich from its western boundary while the eastern boundary of the district runs along boundaries of Balrampur and Siddharth Nagar. The slope of district is from west-north to south-east direction. Total area of the district is approximately 3977 squire Km (Gonda, 2002). It has four tehsils viz- Gonda, Tarabganj, Colonelganj and Mankapur. The district Gonda is dividedin two physical regions viz- Uparhar (Upland) and Tarhar. The Upland region extends from southern most region of Rapti to Gonda town, occupying 45% of total area. The Tarhar is about 15 feet elevated area extending from Gonda town to Ghaghra river, occupying 24% of total area of the district.

Gonda district is a part of trans-Ghaghra plains and made up of sedimentad soils of Ghaghra and its related rivers. The entire district of Gonda is traveresed by Ghaghra, Rapti, Kuwano,

Bisuhi, Terhi and Soheli rivers. The district is too characterised by the presence of a large number of annual and perennial water bodies which have been formed by abandoned channels of rivers or by deep natural depressions in which water is collected without finding any outlet. These water bodies have been observed potent source of fish production in the district.

The study area, i.e. the three blocks of the Gonda district, known as Pandrikripal, Intiathoke and Mujehana are agrriculturally backward, but in case of fish farming, it is quite important. Maximum number of fish farmers (community ponds) existed in the region. Two fish seed hatcheries are located in the study area of the district— one in Jhanjhri block and another hatchery is Mankapur in block. Agroclimatic conditions and socio-economic status of this area is homogenous (Appendix-I).

Out of 16 blocks of the Gonda district three blocks namely pandrikripal, Intiathoke and Mujehana were selected for the study. The total 46 villages were selected. Total repondents were 120 consisting 64 small fish farmers (pond size below 1 ha) and 56 large fish farmers (pond size above 1 ha) (Table III-1, III-2 and III.3).

Sampling Design

A multistage random sampling technique was adopted to draw the ultimate sample of 120 fish farmers from 3 blocks of the Gonda district where community fish farmng practice took

Table III.1 : List of Villages of Block Padrikripal selected for the study along with community ponds.

S. N.	Name of Villages	Small Ponds		Large ponds		Total	
		Number	Area (in ha)	Number	Area (in ha)	Number	Area (in ha)
1.	Bishkohar	1	0.76	—	—	1	0.76
2.	Chaturbhuj Jot	2	1.54	—	—	2	1.54
3.	Parsa sohsha	1	0.55	1	1.26	2	1.81
4.	Basantpur	1	0.82	1	1.52	2	2.33
5.	Subhagpur	1	0.81	—	—	1	0.81
6.	Khaira	2	0.75	—	—	2	0.76
7.	Duttnagar	1	0.86	—	—	1	0.86
8.	Eurarti Bishen	—	—	1	2.52	1	2.52
9.	Ramapur	2	1.24	1	1.24	3	2.48
10.	Ghanauli	—	—	1	1.36	1	1.36
11.	Bakhorira	2	1.66	—	—	2	1.66
12.	Besiachekar	1	0.51	—	—	1	0.51
13.	Munderwa kala	—	—	1	1.00	1	1.00
14.	Bhatwalia	1	0.34	—	—	1	0.34
15.	Khuwasha	1	0.26	—	—	1	0.26
16.	Naraura Arjun	1	0.92	—	—	1	0.92
17.	Bhiti Pathkauli	4	2.81	—	—	4	0.81
	Total	21	13.83	06	8.80	27	22.63

Table III.2 : List of Villages of Block Itiathoke selected for the study along with community ponds.

S. N.	Name of Villages	Small Ponds		Large ponds		Total	
		Number	Area (in ha)	Number	Area (in ha)	Number	Area (in ha)
1.	Bahlolpur	3	2.26	7	8.24	10	10.50
2.	Intiathoke	1	0.92	—	—	1	0.92
3.	Birurapur	—	—	2	3.51	2	3.51
4.	Nawshahra	—	—	1	1.00	1	1.00
5.	Dikhlaul	7	4.51	6	6.74	13	11.25
6.	Purepandit	—	—	2	2.51	2	2.51
7.	Teliyani Kanungo	1	0.81	—	—	1	0.81
8.	Madhya Nagar	2	1.41	—	—	2	1.41
19.	Pandey Purwa	—	—	6	8.74	6	8.74
10.	Gaujendrapur	2	1.12	—	—	2	1.12
11.	Baraipara	2	1.54	—	—	2	1.54
12.	Harraiya Jhumau	2	0.91	—	—	2	0.91
13.	Parsia	2	1.00	2	3.00	4	4.00
14.	Goodidai	1	0.46	—	—	1	0.46
15.	Alawalpur	2	0.74	—	—	2	0.74
	Total	25	15.68	26	33.74	51	49.42

Table III.3 : List of Villages of Block Mujehana selected for the study along with community ponds.

S. N.	Name of Villages	Small Ponds		Large ponds		Total	
		Number	Area (in ha)	Number	Area (in ha)	Number	Area (in ha)
1.	Trilokpur	3	2.61	4	5.40	7	8.01
2.	Rudragrain Nausi	1	0.91	—	—	1	0.91
3.	Dhaurei	1	0.84	—	—	1	0.84
4.	Mujehana	1	0.80	2	3.74	3	4.54
5.	Dinara	3	2.10	3	9.25	6	11.35
6.	Khirbhari	2	1.35	—	—	2	1.35
7.	Dhanepur	4	3.22	5	18.74	9	21.96
8.	Zigna	—	—	1	1.26	1	1.26
19.	Abhayraj Purwa	—	—	1	1.24	1	1.24
10.	Nausi	—	—	1	1.35	1	1.35
11.	Rajapur	—	—	1	1.76	1	1.76
12.	Retwagara	—	—	3	5.34	3	5.34
13.	Lalpurwa	1	0.96	—	—	1	0.96
14.	Kotia	2	1.24	3	7.26	5	8.50
	Total	18	14.03	24	55.34	42	69.27

place. Fish cultivation practices in this region varies from primitive traditional (extensive fish farming) to the modern technological farming system (semi-intensive fish farming). Intensive fish farming is lacking in this region.

Sampling was done in three steps as given below :

First Step : A list of fish farmers who are engaged in community fish farming was obtained from Fish Farmers Development Agnecy (F.F.D.A.). From this list, three blocks where number of fish farmers practising C.F.F. system were selected.

Second Step : In this step, list of villages was prepared in which community fish farming system is in practice. It was observed that in one village one community pond is located. In this case, village cluster was prepared considering their locational proximity as well as cultural homogeneity.

Final Step : Eight clutsters were selected randomly, two from Pandrikripal block, three from Itiathoke and Mujehana block each and total respondents were classified into two groups : (i) Small fish farmers having pond below 1 ha; and (ii) Large fish farmers having pond above 1 ha in size(Table III. 1, 2, 3).

Development of Interview Schedule.

A structured schedule was prepared in order to conduct the survey of C.F.F., which comprises of five parts :

(1) Household schedule.

(2) Technical details regarding fish farming.

(3) Attitude towards fish farming.

(4) Economics of community fish farming.

(5) Problems in fish farming.

The schedule was pre-tested from a group of 15 fish farmers, with an idea to modify, add or delete the items of the schedule against ambiguity (Appendix-II).

Period of enquiry.

The data pertaining to selected farmers were obtained during the period December 2005 to July 2006 through help of schedules and by the direct personal enquiries survey method.

SECONDARY DATA

Secondary data included in the study were :

(i) Renovation of existing ponds.

(ii) Construction of new ponds.

(iii) Indian capture fisheries and fresh water aquaculture resources.

(iv) Resources of U.P. and Gonda district.

(v) Fish production of U.P. and India.

Major sources of Secondary data were.

1. Various reports/bulletins published/unpublished from the

state department of fisheries, CIFA (Central Inland Freshwater Aquaculture), CICFRI (Central Inland Capture Fishery, Research Institute), FFDA (Fish Farmars Development Agency); and

2. Statistical reports of Gonda and NABARD's reports.

Methods of Analysis

The data thus collected were transferred on tabulation sheets. They were than analysed and interpreted in the light of the objectives and hypothesis set-up for this study.

The use of statistical tests in research.

Several different statistical methods have been used in this study. In the broad frame work, both descriptive and inferential statistics were employed in the analysis of qualitative and quantitative data and interpretation of findings have been made accordingly. The procedure for rejecting and not rejecting hypothesis is as follows ;

1. State the null hypothesis.
2. Choose a statistical test.
3. Specify significance level on the sample size.
4. Find the sampling distributin of statistical tests.
5. Compute the value of statistical tests using the data obtained from the sample. If that value is in the region of rejec-

tion, the decision was to reject the null hypothesis. If that value is outside the region of rejection the decision is that the null hypothesis could not be rejected at the choosen level of significance.

In India's concern for raising agricultural production and socio-economic development of villages, various attitudinal problems are coming in the way. One reason for the poverty and poor adoption of farm technology is unfavourable attitude of farmers towards innovations. Thus, it is highly desirable that a realistic appraisal of farmers in this regard is made. This is possible only when a reliable and valid scale is developed for the purpose. The following steps were followed in developing an attitude measurement scale :

1. Item Collection.

A number of items, that is statements reflecting favourable and unfavourable attitude towards community fish farming, were developed by review of related literatures, functioning of F.F.D.A. and personal observation.

2. Editing the sentences.

Thurstone and Chane (1929), Wang (1932), Linkert (1932), Bird (1940) and Edward and Kilpatrick (1948) have suggested various informal criteria for editing statements to be used for construction of an attitude scale. Their suggestions are given be-

low :

(a) Avoid statements that refer to the past rather than to the present;

(b) Avoid statements that are factual or capable of being interpreted as factual;

(c) Avoid statement that may be interpreted in more than one way;

(d) Avoid statements that are irrelevant to psychological object under consideration;

(e) Avoid statements that are likely to be endorsed by almost everyone or by almost no one;

(f) Select statements that are believed to cover the entire range of the effective scale of interests;

(g) Keep the language of the statements simple, clear and direct;

(h) Statements should be short, rarely exceeding 20 words;

(i) Statements containing universals such as always, none and never often induce ambiguity and should be avoided;

(j) Each statement should contain one complete thought;

(k) Words, such as only, just, nearly and others of a similar nature should be used with care and moderation in writing statements;

(l) Whenever possible, statements should be in the form of simple sentences rather in the form of compound or complex sentences;

(m) Avoid the use of words that may not be understood by those who are given completed scale; and

(n) Avoid the use of double negatives.

All the above mentioned measures were taken care of in the construction and development of sentences.

3. Development of a preliminary scale.

In the development of an attitude measurement scale, Linkert's method of summated rating was used. This method eleminates the need for judges to sort out the sentences and is, therefore, nor cumbersome. The imporance of each sentences in this scale is fully emphasised.

4. Data collection.

Sixty-four small fish farmers and fifty-six large fish farmers were selected from forty-six villages of Pandrikripal, Itiathoke and Mujehana blocks of Gonda district. They were asked to react to each statement on the following five points :

SA = Strongly Agree

A = Agree

UD = Undecided

DA = Disagree

SDA = Strongly Disagree

5. Item analysis.

The item analysis is an important step to construct a valid and reliable scale. The purpose of item analysis is to examine how well each item diseriminates between persons having different attitudes on the basis, the items with good discriminatory values were retained and other eleminated.

The following steps as suggested by Edwards were followed in the item analysis :

1. The total score was found for each person on all items in the preliminary sereis. The various responses were assigned numerical weights varying from five-strongly agree, four-Agree, three-Undecided, two-Disagree, one-Strongly disagree for positive sentences. The total score was summation of numerical weights assigned to the responses which an individual checked;

2. The scored papers were placed in the rank order of total scores;

3. Eighteen of the subjects with highest total scores and also eighteen of the subjects with the lowest total scores were segregated. It was assumed that these two groups would provide criterion groups in items of which to evaluate an

individual statements;

4. In evaluating the reponsese in high and low groups on the individual statements, the statistical formula for critical ration 't' was used.

$$t = \frac{\overline{X}H - \overline{X}L}{\sqrt{\frac{\Sigma\left(XH - \overline{XH}\right)^2 + \Sigma\left(XL - \overline{XL}\right)^2}{n(n-1)}}}$$

5. The value of 't' is a measure of the extent to which a given statement differentiates between the high and low groups. As a crude and approximate rule of thumbs, we may regard any 't' value of equal to or greater than 1.75* as indicating that the average response of the high and low groups to a statement differs significantly provided we have eighteen subjects in the high group and also in the low group. On this basis the following sentences with 't' value of more than 1.75 were retained in the scale.

ECONOMIC DEVELOPMENT

Classification of fishponds.

On the basis of stocking size and stocking density, fishponds (both small and large) were classified into four groups :

1. Small fishponds :

SPA Fry stage (25—30mm) as a stocking material with stocking density 10,000 — 20,000/ha/year.

Table III.4 : Showing 't' value of retained attitude statements

S. No.	Statements	't' value
1.	Fish farming can best be done only by the 'Mallah' community	2.88
2.	The present procedure of granting pattas (lease) to fish farmers is satisfactory and needs no improvements	3.96
3.	The supply of inputs like fingerlings and feeds etc. is timely and adequate	2.35
4.	C.F.F. system is not successful because village community pond is used for other purposes	2.61
5.	Taking loan for fish farming is a complicated process and hence everyone can not avail of it	3.51
6.	Community fish farming is only for rich and influenctial people of village	2.11
7.	Training of fish farmers through F.F.D.A. has helped farmers in better yield	2.38
8.	C.F.F. is a risky and complicaed affair	3.24
9.	Maketing facilities for fish farmers are inadequate and need improvement	3.06
10.	C.F.F. is a profitable enterprise	4.45
11.	Fish farming is a must to supplement the improvement diet of the people	2.35
12.	Facilities provided by the F.F.D.A. are not enough	3.10
13.	Even people of high case can successfully adopt C.F.F.	3.81
14.	The loans given for fish farming are not being regularly recovered	1.95

Table III.5 : Showing 't' value of Discarded attitude statements

S. No.	Statements	't' value
1.	The behaviour of extension personnel towards fish farming is not upto the mark	0.25
2.	The F.F.D.A. should have its own extension workers at the villages	0.35
3.	F.F.D.A. extension personnel do not possess the requistic expertise in fish farming	0.58
4.	It is possible to persuade vegetarian people to eat fish through mass education and persuasion	0.74

SPB Fry stage (25—30 mm) as a stocking material with stocking density 20,001 and above/ha/year;

SPC Fingerling stage (80–120 mm) as a stocking material with stocking density 5,000–8,000/ha/year; and

SPD Fingerling stage (80–120 mm) as a stocking material with stocking density 8,001 and above/ha/year.

2. Large fishponds.

LPA Fry- stage (25–30 mm) as a stocking material with stocking density 10,000–20,000/ha/year;

LPB Fry stage (25—30 mm) as a stocking material with stocking density 20,001 and above/ha/year;

LPC Fingerling stage (80–120 mm) as a stocking material with stocking density 5,000–8,000/ha/year; and

SPD Fingerling stage (80–120 mm) as a stocking material with stocking density 8,001 and above/ha/year.

Cost Analysis.

Cost analysis of fish farms has been worked out for interpretation of the data. Mainly two types of costs are involved—Fixed cost and Variable Cost.

(a) Fixed Cost.

1. Rent of Pond; and

2. Interest on Fixed Cost.

(b) Variable Cost.

1. Cost of lime;
2. Cost of manure and fertiliser;
3. Cost of seed;
4. Cost of feed;
5. Cost of labour— (a) Hired labour (b) Family labour;
6. Cost of Harvesting;
7. Miscellaneous Cost; and
8. Interest on Working Capital.

Input–Output relationship.

Input-output relationship is an important analytical exercise for evaluating the variablility of a partiular enterprise. It is obtained by dividing the Gross Return (output) of a farm devided by the Total Cost (Input). Thus,

$$\text{Input - output relationship} = \frac{\text{Gross Return}}{\text{Total Cost}}$$

Development of Scales to Identify the Problems.

The study was measured by the scale developed by Haque (1981). The ressondents listed out three most important problems they faced in the culture of fish and ranked them accordingly. The problems ranked 1, 3 and 3 were given scores 3, 2 and 1 respectively.The total rank score of each problem was obtained

score and adding them up. The problems were then arranged in descending order of importance on the basis of their total score and finally ranked. Three most important measures to these problems as perceived by the farmers also were ranked in a similar manner.

❑❑❑

Chapter-IV

RESULT AND DISCUSSION

IV. A : PRESENT STATUS OF CFF IN GONDA DISTRICT

IV. B : ECONOMICS OF CFF

IV. C : PROBLEMS OF CFF IN THE STUDY AREA

IV A : PRESENT STATUS OF CFF IN GONDA DISTRICT

During the course of the present study an effort was made to find out present status of community fish farming practice in the Gonda district. The analysis made in this regard is presented in this section. This section is divided into three sub-sections :

(A) Physical status of community pond in C.F.F. system of study area.

(B) Cultural practices/managemental aspects of community fish farming system.

(C) Socio-economic status of fish farmers of C.F.F. system.

(A) Physical status of community pond in C.F.F. system of study area.

Table IV.A.1 presents details about community fishpond of the study area. Total number of small ponds and large ponds surveyed was 64 and 56 respectively. On the basis of depth community fishpond classified as shallow pond (> 1 m deep), medium depth pond (1.5-2.5 m) and deep pond (>2.5 m). Among small ponds 19 (29.68%) were shallow, 27 (42.185%) were medium and 18 (14.28%) were shallow, 15 (26.78%) were medium depth pond and 33 (58.93%) were deep pond. From the table it is clear that 51 (42.51%) community ponds were deep and 42

(35.00%) community ponds were medium deep pond and 27 (22.51%) community ponds were shallow and not good for fish farming.

The maxium depth of small pond renges from 85.00 cm to 275.00 cm and average depth 147.00 cm. The maximum depth of large pond ranges from 90.00 cm to 295.00 cm and average depth 182.70 cm.

The total area under small community ponds under study area was 43.40 ha and average size of small pond was 0.67 ha. The total area under large community ponds surveyed was 97.96 ha and average size of large fishponds was 1.76 ha. Total surveyed pond area was 141.35 ha.

In case of small ponds 14 (21.876%) were rainfed pond, 24 (37.6%) small ponds were ground water fed pond and 26 (40.626%) small ponds were canal fed ponds. In case of large community ponds 21 (37.6%) were ground water fed ponds, 18 (32.15%) were rainfed ponds and 17 (30.35%) were canal fed pond.

On the basis of water retention the community ponds were classified as seasonal and perennial ponds. Most of the small ponds 46 (71.876%) were seasonal and 18 (28.124%) were perennial ponds, whereas 33 (58.93%) large ponds were perennial and 23 (41.08%) were seasonal ponds.

From physical status discussed in this section, it shows that community ponds were good for scientific fish culture.

(B) Cultural practices/managemental aspects of community fish farming system.

The major cultural/managemental practices chosen for description and comparison were :

(1) Seed management practices in C.F.F. system :

(i) Fish seed collection.

(ii) Stocking combination of fish seed.

(iii) Stocking density of fish seed.

(2) Feed and feeding management practices in C.F.F. system :

(i) Types of feed used in C.F.F. system.

(ii) Feeding management.

(iii) Level of fish feed application.

(3) Manuring in C.F.F. system :

(i) Types of manure used in C.F.F. system.

(ii) Level of manure application with their recommended rate.

(4) Liming to pond in C.F.F. system :

(i) Use of lime in C.F.F. system.

(ii) Level of manure application with their recommended doeses.

(5) Harvesting :

(i) Nets used during the time of harvesting.

(ii) Number of harvesting in single crop.

(1) Seed management practices in C.F.F. system :

(i) Fish seed collection.

The table IV.A.2 shows the distribution of fish farmers according to collections of fish seed. Figures reveal that 28 (43.76%) small fish farmers collected fish seed from nearby hatchery, whereas 20 (35.7%) large fish farmers collect fish seed from hatchery. 16 (25.01%) of small fish farmers and 12 (21.44%) large fish farmers collect seed from river (Terhi). 20 (31.24%) of small fish farmers and 24 (42.85%) of large fish farmers buy seed from Hawker, who collect seed from Ghaghra. From the table (IV.A.2). It is clear that majority of small farmers collects seed from local hatchery and majority of large fish farmers collects seed from Ghaghra river.

To find out if there was a significant difference between small and large fish farmers regarding their seed collections, the Null hypothesis was tested.

Null Hypothesis (Ho)

There was no significant difference between small and large fish farmers as regards their seed collection practices.

The calculated value of x^2 was found to be 1.73, which was less than the table value of 5.98 at 0.05 percent level of significance for two degree of freedom. Therefore, the null hypothesis

(Ho) was accepted.

Therefore, it may be concluded that there was no significant difference between small and large fish farmers regarding their seed collection practice. Both collects fish seed from where seed is easily available and good in quality.

(ii) Stocking combination of fish seed.

From the table (IV.A.3) it is found that Indian major carps, only common carps are most popular stocking combination in community fish farmers practices. Among exotic carps, only common carp is popular among both small and large fish farmers. The table reveals that 46 (71.876%) of small fish farmers and 30 (53.56%) of large fish farmers preferred the Indian major carp as stocking combination, i.e. 3-sp., combination. 18 (28.124%) small fish farmers and 22 (39.28%) large fish farmers prefer the 4-sp. combination. Three Indian major carp and common carp fish sp. only 4 (7.14%) large farmers culture 6- sp. cobination.

To find out if there was a significant difference between small and large fish farmers regarding their stocking combination of fish seed, the Null hypothesis was tested.

Null Hypothesis (Ho)

There was no significant difference between small and large fish farmers as regards the stocking combination of fish seed.

The calculated value of x^2 was found to be 7.26 which was greater than the table value of 5.98 at 0.05 percent level of significance for two degree of freedom. Therefore, the null hypothesis (Ho) was rejected and alternative hypothesis was accepted.

Therefore, it may be concluded that there was significant difference between small and large fish farmers regarding their stocking combination. Large farmers keenly prefer exotic carps along with Indian major carp, as a stocking material.

(iii) Stocking density of fish seed.

Table IV.A.4 shows the distribution of fish farmers according to stocking density of fish seed.

Table IV.A.4 points out that 16 (25.01%) of small fish farmers and 14 (25.01%) of large fish farmers stock fry stage fish seed with stocking density of 10,00000-20,000/ha and 16 (25.01%) of small fish farmers and 14 (25.01%) of large fish farmers stocks more than 20,000/ha fry in their pond. 16 (25.01%) of small fish farmers and 14 (25.01%) of large fish farmers stocks fingerling stage with stocking density of 5,000-8,000/ha and 25 percent of both small fish farmers and large fish farmers stock fingerling stage of seed more than 8,000/ha.

(2) Feed and Feeding management practices in C.F.F. system.

(i) Types of feed used in C.F.F. system.

Table IV.A.5 indicates the various types of feed used in

C.F.F. system of study area.

Table IV.A.5 shows those only 8 (12.6%) small fish farmers depended on natural fish food plankton, which grows in pond water. They did not provide any supplementary food. 31 (48.45%) small fish farmers used rice bran/rice polish as supplementary food to fish and 25 (39.05%) small fish farmers use balanced supplementary feed rice bran and mustard oil cake to their pond and fish feed. On the other hand, table indicates that all large fish farmers provide supplemetary feed beside the plankton, which is natural food. 35 (62.4%) large fish farmers provide balanced supplementary feed, i.e. rice bran and mustard oil cake, which is locally available fish feed. 21(37.4%) large fish farmers provide only rice bran/rice polish as fish feed.

Null Hypothesis (Ho)

There was no significance difference between small and large fish farmers as regards fish feed they use.

The calculated value of x^2 was found to be 8.12% which was greater than the table value of 5.98 at 0.05% level of significance for two degree of freedom. Therefore, the null hypothesis (Ho) was rejected and another hypothesis was accepted.

Therefore, it may be concluded that there was significant difference between small and large fish farmers regarding type of fish feed they use. Large fish farmers were more scientifically

advance and particular in providing balanced diet to fish.

(ii) Feeding management

Table IV.A.6 presents that out of 64 small fish farmers only 56 fish farmers provide supplementary feed to fish. 8 small farmers depended on only natural fish food i.e. plankton (Table IV.A.5).

Table IV.A.6 indicates that out of 56 small fish farmers 23(41.06%) small fish farmers used broad casting feeding method, 4 (7.15%) small fish farmers use between feeding method 1 and 29 (51.98%) small fish farmers prefer bag feeding method.

Table IV.A.6 gives idea that 31(55.37%) of large fish farmers prefer bag feeding method followed by bradcasting method 19 (33.94%) and basket feeding method 6 (10.72%).

From the table it is clear that bag-feeding method is most popular among both small and large fish farmers 60(53.58%) because it is time saving process.

Null hypothesis (Ho).

There was no significance difference between small and large fish farmers as regards their feeding method.

The calculated value of x^2 was found to be 0.84, which was lesser than the table value of 5.98 at 0.05 percent level of significance for two degree of freedom. Therefore, the null hypothesis was accepted and alternative hypothesis was rejected.

Therefore, it may be concluded that there was no significant difference between small and large fish farmers regarding their feeding management.

(iii) Level of fish feed application.

Table IV.A.7 shows the level of feed applications with their recommended rate of C.F.F. system.

Table IV.A.7 clearly indicates that large fish farmers (1606.86 kg/ha) use more feed than the small fish farmers (1325.35 kg/ha). Small fish farmers use feed (53.02%) of recommended rate where as large fish farmers use feed 64.26% of recommended rate.

(3) Manuring in community fish farming system.

(i) Types of manure used in C.F.F. system.

Table IV.A.8 shows types of manure used in C.F.F. This table gives an idea about different types of manure used in C.F.F. system. The table further indicates that 40 (70.31%) small and 42 (75.01%) large fish famers manure their pond with cattle dung, which is easilly available in village. 14 (21.87%) small and 8 (14.28%) large fish farmers manure their pond with duck droppings and only 5 (7.80%) small fish farmers and 6 (10.72%) large fish farmers manure their pond with polutry litter.

From the table (IV.A.8) it is clear that 87 (72.4%) fish farmers preter cattle dung as pond manure as it is easily available.

Null Hypothesis (Ho)

There was no significant difference between small and large fish farmers as regards type of manure they used.

The calculated value of x^2 was found t o be 1.4, which was lesser than the table value of 5.98 at 0.05 % level of significant for two degree of freedom. Therefore, the null hypothesis (Ho) was accepted and alternative hypothesis was rejected.

Therefore, it may be concluded that there was no significance difference between small and large fish farmers as regards types of manure they used.

(ii) Level of manure applicatiion with their recommended rate.

Table IV.A.9 show the level of manure application with their recommended rat e in C.F.F. system.

The table points out that small fish farmers used cattle dung 31.61% of recommended rate and large fish farmers use cattle dung 26.81% of recommended rate. In case of poultry litter small fish farmers used only 11.24% of recommended rate and large fish famers used 13.86 of recommended rate . In case of such dropping small fish farmers use 21.66% and large fish farmers 22.81% of recommended rate.

Therefore, it may be concluded that community fish farmers use low amount of manure than recommended dose, because

village ponds are rich in organic manure and in rainy season the load of organic matter increase.

(4) Liming to pond in C.F.F. system.

(i) Use of Lime in C.F.F. system.

Table IV.A.10 presents the distribution of fish farmers according to use of lime. The table indicates that fish farmers occasionally use lime 71 (59.16%) of which 31 (48.44%) are small fish farmers and 40 (71.42%) are large fish farmers. 19 (29-68%) small and 10 (17.85%) large fish farmers use lime only at the time of pond preparation and small number of 6(10.72%) large fish farmers and 14 (21.87%) small fish farmers use lime at regular interval.

The table (IV.A.10) clarifies that a majority of fish farmers use lime when they need it, especially when diseases of stress in pond environment takes place.

Null Hypothesis (Ho).

There was no significant difference between small and large fish farmers as regards use of lime.

The calculated value of x^2 was found to be 6.64 which was greater than the table value of 5.98 at 0.05% level of significance for two degree of freedom. Therefore, the null hypothesis was rejected and alternative hypothesis was accepted.

Therefore, it may be concluded that there was significant

difference between small and large fish farmers regarding their use of lime. Small fish farmers are more particular in using lime at regular interval.

(ii) Level of manure application with their recommended doses.

The views regarding level of lime application with their recommended doses presented in table (IV.A.11) shows clearly that large fish farmers use average 309.41 kg/ha of lime in a year, where recommended doses @ 200 kg/ha/month for ten month will be 2000 kg/ha and percentage of recommended doeses 15.46% in case of large fish farmers and 12.6% in case of small fish farmers. The average dose of lime is 252.04 kg/ha/yr. in case of small fish farmers.

(5) Harvesting.

(i) Nets used during the time of harvesting.

An attempt was made to find out the distribution of fish farmers according to types of net and findings are reflected in table (IV.A.12).

Before turning to the issue of the table, it would be proper to state about different nets. In the study area different nets and traps are used for fishing from ponds. The table depicts only the nets, which are used for commercial catch from ponds. The traps and hooks and lines are used for only catching few fish for house-

hold use.

Table (IV.A.12) shows that dragnets are commonly used by both small 44 (68.76%) and large 37 (66.06%) fish farmers. 20 (31.24%) small and 14 (25.01%) large fish farmers used Gill nets. Cast net was used only by a small amount of large fish farmers 5 (8.94%). From the table, it can be seen that dragnets are most popular gears for harvesting fish.

Null Hypothesis (Ho)

There was no significant difference between small and large fish farmers as regards nets used during harvesting.

The calculated value of x^2 was found to be 6.15 at 0.05% level of significance for two degree of freedom. Therefore, the null hypothesis was not rejected.

Therefore, it may be concluded that there was significant difference between small and large fish farmers regarding net. Large fish farmers used different types of net, viz. gill net, drag net and cast net.

(ii) Number of harvesting in single crop.

Table IV.A.13 shows out number of nettings takes place by farmers for complete harvesting. Majority of small fish farmers 28 (43.74%) harvested their produce 1 to 2 times, 24 (37.4%) small fish farmers harvested their produce 3 to 4 times in a year and 12 (18.74%) harvest more than 4 times for complete harvest-

ing. On the other hand, 24 (42.87%) large fish farmers harvest fish more than 4 times and 18 (32.15%) large fish farmers harvest fish 1 to 2 times and 14 (25.01%) large fish farmers harvest fish 3 to 4 times in a year.

From the table (IV.A.13) it is clear that small fish farmers harvest their produce 1 to 2 times because mostly they borrow nets on rent, and large fish farmers have their own net.

Null Hypothesis (Ho).

There was no significant difference between small and large fish farmers as regards number of netting.

The calculated value of x^2 was found to be 8.32 which was greater than the table value of 5.98 at 0.05% level of significance for two degree of freedom. Therefore, the null hypothesis were not accepted and alternative hypothesis were not rejected.

Therefore, it may be concluded that there was significant difference between small and large fish farmers regarding number of netting.

(C) Socio-economic status of Fish farmers of C.F.F. system.

This section is devoted to the description and comparison of selected personal characteristics and socio-economic status of fish farmers of C.F.F. system.

The personal characteristics chosen for description and comparison were :

(1) Age of fish farmers

(2) Caste of fish farmers

(3) Education of fish farmers

(4) Experience of fish farmers

(5) Occupation of fish farmers

(6) Size of land holding of fish farmers

(7) Family size of fish farmers

(8) Socio-economic status of the fish farmers.

(1) Age of fish farmers.

Table IV.A.14 shows distribution of the fish farmers according to their age group. The table shows that 8 (12.5%) small fish farmers were under old age group, whereas 6 (10.71%) large fish farmers in the same group. Therefore, 34 (53.124%) small fish farmers under middle aged group people and 32 (57.15%) large fish farmers under the middle-aged group. 22 (34.376%) and 18

(32.15%) of small fish farmers and large fish farmers respectively were in young aged group.

From the table (IV.A.14) it is found that small and large fish farmers were middle-aged people. It may be due to nature of fish farming as business. It requires lot of efforts and resources to establish the business. Therefore, comparatively older age and expereince are required for fish farming business.

Null Hypothesis (Ho)

There was no significant difference between small and large fish farmers as regards their age. The age of small and large fish farmers arranged chronologically are contained in the table (IV.A.15).

The calculated value of found to be 0.22, which was less than the table value of z (1.95) at 5% level of significance. Hence, null hypothesis were accepted. It may be concluded that there was no significant difference between small and large fish farmers regarding their age. Both small and large fish farmers were middle-aged people.

(2) Caste of fish farmers.

Out of 120 fish farmers 108 (90%) were Hundu in religion and 12 (10%) were Muslims in faith.

The table (IV.A.16) shows the caste wise distribution of small and large fish farmers. Table IV.A.16 shows distribution of

fish farmers in relation to their caste category. Among 108 fish farmers, only 5 (4.64%) belongs to Thakur caste, only 1 (0.08%) belongs to Lonia and 9 (8.34%) belongs to Kurmi and 70 (64.82%) belongs to Mallah caste. Total backward class was dominated by Mallah. 23 (21.28%) of fish farmers belongs to Harijan caste. In case of small fish farmers 37 (61.66%) and large fish farmers 33 (68.74%) belong to Mallah caste. The most significant thing ws that Mallah constituted the majority among small and large fish farmers. This is an occupation, which traditionally belongs to "Mallah". Higher caste contributes smaller number in table (IV.A.17). It is quite logical that this was so because among higher caste fish farming is considered as a taboo. But small number of higher caste involved in fish farming shows that breaking of the barrier of caste.

Null Hypothesis (Ho)

There was no significant difference between small and large fish farmers as regards their caste.

The calculated value of x^2 was found to be 0.42, which was less than the table value of 5.98 at 0.05% level of significance for two degree of freedom. Therefore, null hypothesis were accepted.

Therefore, it may be concluded that there was no significant difference between small and large fish farmers regarding their caste. Mostly all of them belong to 'Mallah' caste.

(3) Education of fish farmers.

Education of fish farmers was categorised into different levels as per the number of classes passed and ability to read and write. The table (IV.A.18) shows the distribution of small and large fish farmars in connection with their educational level.

As figures in the table showed that the 18 (28.14%) small fish farmers were illiterate and a few number of small fish farmers 7 (10.95%) could read and write, whereas 7 (12.4%) large fish farmers were illiterate and 5 (8.94%) of large fish farmers could read and write.

Further the table IV.A.18 points out that the maximum number of small fish farmers 14 (21.87%) had education level equal to Junior High School, followed by High School level 9 (14.05%), Primary School and upto Intermediate level 8 (12.4%) each.

The table (IV.A.18) indicates that the maximum number of large fish farmers 19 (33.94%) had education level equal to Junior High School, followed by High School level 11 (19.65%), Intermediate level 8 (14.28%), Primary level 4 (7.15%) and only 2 (3.56%) large fish farmers had graduation level of education.

Null Hypothesis (Ho)

There was no significant difference between small and large fish farmers as regards their education.

The frequincey distribution of small and large fish farmers

regarding their education is given in the table (IV.A.19).

The calculated value of x^2 was found to be 6.55, which was greater than the Table value of 5.98 at 0.05 percent level of significance for two degree of freedom. Therefore, the null hypothesis (Ho) was rejected and alternative hypothesis was accepted.

Therefore, it may be concluded that there was significant difference between small and large fish farmers regarding their education. Large fish farmers had more education than small fish farmers.

(4) Experience of fish farmers.

Table IV.A.20 indicated the distribution of the fish farmers according to their experience. Majority of small fish farmers 38 (59.374%) and 35 (62.51%) large fish farmers had 5-10 years experience in community fish farming. About 16 (25.00%) and 8 (14.28%) of small fish farmers and large fish farmers respectively had below 5 years experience. Small and large fish farmers there were 10 (15.626%) and 13 (23.22%) respectively had experience above 10 years.

Null Hypothesis (Ho)

There was no significant difference between small and large fish farmers as regards their experience.

The frequency distribution of small and large fish farmers regarding their experience is given in the table (IV.A.21).

The calculated value of x^2 was found to be 2.65, which was less than the value of 5.98 at 0.05 percent level of significant for two degree freedom. Therefore, null hypothesis was accepted.

Therefore, it may be concluded that there ws no significant difference between small and large fish farmers regarding their experience. Both had medium level of experience in community fish farming.

(5) Occupation of fish farmers.

The following table shows the occupation of fish farmers.

Table IV.A.22 indicated that 82 (68.34%) as suplementary occupation and in case of 20 (31.24%) small fish farmers and 18 (32.15%) large fish farmers; fish farming was main occupation.

It was evident from the table (IV.A.23) that most of the small fish farmers 22 (34.37%) had agriculture as main occupation, whereas large fish farmers 24 (42.87%) the agriculture was also main occupation. The second main occupation of fish farmers were fishing from river, 13 (20.30%) and 8 (14.28%) small and large fish farmers respectively. Other main occupation of small fish farmers were business 3 (4.69%), caste occupation 4 (6.25%) and service 2 (3.125%). Other main occupation of large fish farmers were business 4 (7.15%) and caste occupation 2 (3.56%).

Table IV.A.24 indicated the fish farming was main occupation of small number of the small fish farmers 20 (31.25%) and

18 (31.66%) large fish farmers. In that case, table shows that other supplementary occupations were agriculture, agricultural labour, caste occupation and fishing from river, which were 6 (9.376%), 8 (12.50%), 2 (3.124%) and 4 (6.25%) respectively in case of small fish farmers and 4 (7.15%), 6 (10.72%), 3 (5.37%) and 5 (8.94%) respectively in case of large fish farmers.

(6) Size of land holding of fish farmers.

Figures in the table (IV.A.25) revealed that majority of the small fish farmers 48 (75%) and large fish farmers 43 (76.79%) were having land holding 0-4 hectares. There were small numbers of small fish farmers 4 (6.24%) and large fish farmers 5 (8.94%) who had land holding above 4 hectares. Data showed that 12 (18.76%) small fish farmers and 8 (14.27%) large fish farmers were landless.

Therefore, we may conclude that the majority of small fish farmers 48 (75%) and large fish farmers 43 (76.79%) hand land holding between 0-4 hectares.

Null Hypothesis (Ho)

There was no significant difference between small and large fish farmers as regards their size of land holding.

The following distriubtion of small and large fish farmers regarding their land holding given in the table (IV.A.26).

The calculated value of x^2 was found to be 1.65, which was

less than the table value of 3.85 at 0.05% level of significance for one degree of freedom. Therefore, the null hypothesis was accepted.

Therefore, it may be concluded that there was no significant difference between small and large fish farmers regarding their size of land holding. Both small and large fish farmers had the same size of land holding.

(7) Family size of fish farmers.

Figures in the table (IV.A.27) clarfied that small fish farmers 29 (45.32%) belonged to medium size family and this was followed by 23 (35.95%) of small fish farmers belonged to small family size and 12 (18.74%) small fish farmers who had large family.

Table (IV.A.27) reflects that the large fish farmers 32 (57.15%) belonged to small size family and this was followed by 14 (25.01%) medium size and 10 (17.85%) large size family in case of large fish farmers.

The average family size of small fish farmers was 8.24 and 6.97 in case of large fish farmers.

Therefore, we may conclude that most of the small and large fish farmers belong to medium family size.

Null Hypothesis (Ho)

There was no significant difference between small and large

fish farmers as regards their family size.

The following distribution of small and large fish farmers regarding their family size are given in the table (IV.A.28).

The calculated value of x^2 was found to be 4.58 which was greater than the table value of 3.85 at 0.05% level of significance for one degree of freedom. Therefore, the null hypothesis was not accepted and hence the alternative hypothesis was accepted.

Therefore, it may be concluded that there was significant difference between small and large fish farmers regarding their family size. Large fish farmers had the small family than small fish farmers.

(8) Socio-economic status of the fish farmers.

The socio-economic status of fish farmers was measured using the scale developed by Trivedi and Udai Pareek (1964). The score was computed and distribution of small and large fish farmers on Socio-economic scale are presented.

As revealed from the table (IV.A.29) majority of small fish farmers 34 (53.14%) and large fish farmers 30 (53.56%) had medium socio-economic status. This was followed by 27 (42.18%) small fish farmers and 16 (28.58%) large fish farmers who had low socio-economic status. There were 3 (4.67%) small fish farmers in the high range nd 10 (17.85%) large fish farmers in the same group.

Therefore, we may conclude that most of the small and large fish farmers had medium socio-economic status.

Null Hypothesis (Ho)

There was no significance difference between small and large fish farmers as regards their socio-economic status.

The following distribution of small and large fish farmers regarding their socio-economic status are given in the table (IV.A.30).

The calculated value of x was found to be 0.34 which was less than the table value of 'x' (1.95) at 5% level of significance, hence the null hypothesis was accepted and hence the alternative hypothesis was rejected.

It may be concluded from the table that there was no significant difference between small and large fish farmers regarding their socio-economic status. They had the same socio-economic status. This result reveals that farmers of small and large group are same as socio-economic scale but fish farming supplements to their total income.

Table IV.A.1 : Details about community fish pond of C.F.F. system in study area

S. No.	Particulars about pond	Small pond (> 1 ha)		Large Pond (< 1 ha)		Total	
		No.	%	No.	%	No.	%
1.	Number of ponds surveyed	64	100.00	56	100.00	120	100.00
2.	Total area under community pond surveyed (ha)	43.40	-	97.96	-	141.35	-
3.	Pond average size (ha)	0.67	-	1.76	-	1.19	-
4.	Range of pond size (ha)	0.13	-	1	-	0.13	-
		0.94	-	4.26	-	4.24	-
5.	Depth of pond						
	(a) Shallow pond (>1m depth)	19	29.68	8	14.28	27	22.51
	(b) Medium pond (1.5 - 2.5m)	27	42.18	15	26.78	42	35.00
	(c) Deep pond (<2.5m)	18	28.13	33	58.93	51	42.51
6.	Range of maximum pond depth (m)	0.86	-	0.91	-	0.86	-
		2.74	-	2.96	-	2.94	-
7.	Pond average depth (m)	147.6	-	182.8	-	-	-
8.	Classification of fish pond on the basis of irrigation						
	(a) Rain fed pond	14	21.876	18	32.15	32	26.68
	(b) Ground water fed pond	24	37.6	21	37.4	45	37.6
	(c) Canal fed pond	26	40.626	17	30.35	43	35.84
9.	Classification of fish pond on the basis of water retention						
	(a) Seasonal pond	46	71.876	23	41.08	69	57.4
	(b) Parennial pond	18	28.124	33	58.93	51	42.4

Table IV. A.2 : Distribution of the fish farmers according to fish seed collection

S. No.	Fish seed collection	Small fish farmer		Large fish farmer		Total	
		No.	%	No.	%	No.	%
1.	From fish seed hatchery	28	43.76	20	35.70	48	41
2.	Riverine collection	16	25.01	12	21.44	28	23.34
3.	Supplied from Ghaghra	20	31.24	24	42.85	44	36.66
4.	Range of pond size (ha)	0.13	-	1	-	0.13	-
	Total	64	100	56	100	120	100

x = 1.73, DF = 2, non significant at 0.05% level of significance.

Table IV. A.3 : Distribution of the fish farmers according to stocking combination of fish seed in C.F.F. system

S. No.	Stocking combination	Small fish farmer		Large fish farmer		Total	
		No.	%	No.	%	No.	%
1.	Indian major carps (I.M.C.)* (3—spp. combination)	46	71.876	30	53.56	76	63.34
2.	I.M.C. + Common Carp (4 spp. combination)	18	28.124	22	39.28	40	33.34
3.	I.M.C. + ** (6 spp. combination)	-	-	4	7.13	4	3.34

x = 7.76, DF = 2, significant at 0.05% level of significance.

* Indian major carps = Catla, Rohu, Mrigal

** Exotic carp = Silver carp, Grass carp, Common carp.

Table IV. A.4 : Distribution of fish farmers according to stocking density of fish seed.

S. No.	Fish seed size and stocking Density/ha	Small fish farmer		Large fish farmer		Total	
		Freq.	%	Freq.	%	Freq.	%
1.	Fry stage (10,000-20,000)	16	25.01	14	25.01	30	25.07
2.	Fry stage (20,001 and above)	16	25.01	14	25.01	30	25.07
3.	Fingerling stage (5,000-8,000)	16	25.01	14	25.01	30	25.07
4.	Fingerling stage (8001 and above)	16	25.01	14	25.01	30	25.07
	Total	64	100.04	56	100.04	120	100.8

Fry stage : 25 - 30 mm in length
Fingerling : 80 - 120 mm in length

Table IV.A. 5 : Distribution of fish farmers according to types of feed used in C.F.F. system.

S. No.	Type of Feed	Small fish farmer		Large fish farmer		Total	
		Freq.	%	Freq.	%	Freq.	%
1.	Plankton (natural food of fish)	8	12.6	0	0.00	8	6.67
2.	Rice bran/Rice polish	31	48.45	21	37.4	52	43.34
3.	Rice bran + mustard oil cake	25	39.05	35	62.4	60	50.01
	Total	64	100	56	100	120	100

x = 8.12, DF = 2, significant at 0.05% level of significance.

Table IV.A. 6 : Distribution of the fish farmers according to feeding method of fish.

S. No.	Feeding method	Small fish farmer		Large fish farmer		Total	
		Freq.	%	Freq.	%	Freq.	%
1.	Broad casting feeding method	23	41.06	19	33.94	42	37.4
2.	Basket feeding method	4	7.15	6	10.72	8.94	
3.	Bag feeding method	29	51.78	31	55.37	60	53.58

x = 0.84, DF = 2, Non-significant at 0.05% level of significance.

Table IV.A. 7 : The level of feed application with recommended rate of C.F.F. system.

S. No.	Supplementary feed (kg/ha/yr)	Small fish farmer	Large fish farmer
1.	Actual rate (Average)	1325.35	1606.84
2.	Recommended rate	2500.01	2500.01
3.	Percentage of recommended rate	53.02	64.26

Table IV.A. 8 : Distribution of the fish farmers according to types of manure used in C.F.F. system.

S. No.	Types of Manure	Small fish farmer		Large fish farmer		Total	
		Freq.	%	Freq.	%	Freq.	%
1.	Cattle dung	45	70.31	42	75.01	87	72.4
2.	Poultry litter	5	7.80	6	10.72	9.16	
3.	Duck droppings	14	21.87	8	14.28	22	18.34
	Total	64	100	56	100	120	100

$x^2 = 1.4$, DF = 2, non-significant at 0.05% level of significance.

Table IV.A. 9 : The level of manure application with recommended rate in C.F.F. system.

S. No.	Types of manure	Small fish farmer			Large fish farmer		
		Recommended rate (t/ha)	Actual rate (t/ha)	% of recommended rate	Recommended rate (t/ha)	Actual rate (t/ha)	% of recommended rate
1.	Cattle dung	20	6.321	31.61	20	5.361	26.80
2.	Poultry litter (t/ha)	18	2.024	11.24	18	2.501	13.88
3.	Duck dropping (t/ha)	15	3.251	21.66	15	3.421	22.81

Table IV. A. 10 : Distribution of fish farmers according to use of lime.

S. No.	Use of lime	Small fish farmer		Large fish farmer		Total	
		Freq.	%	Freq.	%	Freq.	%
1.	Occational	31	48.44	40	71.42	71	59.16
2.	Only at the time of pond preparation	19	29.68	10	17.85	29	24.18
3.	Regular interval	14	21.87	6	10.72	20	16.66
	Total	64	100.04	56	100.04	120	100.8

$x^2 = 6.64$, DF = 2, Significant at 0.05% level of significance.

Table IV. A.11 : The level of lime application with their recommended doses.

S. No.	Lime doses (kg/ha/yr)	Small fish farmer	Large fish farmer
1.	Actual rate (Average)	252.04	309.41
2.	Recommended doses*	2000.01	2000.01
3.	Percentage of recommended doses	12.61	15.46

* @ 200 kg/ha in case of neutral pH per month.

Table IV.A.12 : Distribution of fish farmers according to type of nets used in C.F.F. system.

S. No.	Types of manure	Small fish farmer		Large fish farmer			
		Freq.	%	Freq.	%	Freq.	%
1.	Gill net	20	31.24	14	25.01	34	28.34
2.	Drag net	44	68.76	37	66.06	81	67.51
3.	Cast net	-	-	5	8.94	5	4.18
	Total	64	100.00	56	100.00	120	100.00

x^2 6.15, DF = 2, Significant at 0.05% level of significance.

Table IV.A. 13 : Distribution of fish farmers according to number of netting takes place during cultivation period in C.F.F. system.

S. No.	No. of netting in a year	Small fish farmer		Large fish farmer		Total	
		Freq.	%	Freq.	%	Freq.	%
1.	1 to 2 times	28	43.74	18	32.15	46	38.34
2.	3 to 4 times	24	37.4	14	25.01	38	31.66
3.	More than 4 times	12	18.14	24	42.87	36	30.01
	Total	64	100.04	56	100.04	120	100.8

$x^2 = 8.31$, DF = 2, Significant at 0.05% level of significance.

Table IV. A.14 : Distribution of the fish farmers according to age group.

Sf - 64, LF - 56

S. No.	Age Group	Small fish farmer		Large fish farmer	
		No.	Percentage	No.	Percentage
1.	Young (20-35 yrs.)	22	34.376	18	32.15
2.	Middle (35-50 yrs.)	34	53.124	32	57.15
3.	Old (50-65 yrs.)	8	12.501	6	10.71
	Total	64	100.00	56	100.00

Table IV. A.15 : Showing age scores of fish farmers.

N (SF) - 64, N (LF) - 56

S. No.	Age SF	Age LF	S. No.	Age SF	Age LF	S. No.	Age SF	Age LF	S. No.	Age SF	Age LF
1	21	34	17	49	31	33	44	28	49	47	40
2	29	31	18	22	46	34	27	32	50	45	37
3	40	32	19	26	45	35	54	51	51	36	51
4	22	29	20	43	43	36	32	45	52	54	43
5	28	49	21	42	33	37	53	27	53	37	54
6	42	27	22	45	42	38	43	28	54	34	48
7	21	48	23	43	45	39	30	42	55	36	49
8	44	32	24	21	41	40	42	41	56	33	52
9	45	41	25	42	42	41	41	30	57	39	-
10	26	43	26	37	45	42	31	39	58	42	-
11	45	53	27	55	41	43	40	36	59	43	-
12	52	44	28	31	29	44	39	31	60	23	-
13	46	48	29	38	33	45	27	37	61	44	-
14	47	32	30	59	42	46	38	31	62	52	-
15	25	43	31	30	53	47	47	38	63	27	-
16	48	48	32	43	43	48	28	37	64	52	-

z = 0.22, Non-significant at 5% level of significance.

Table IV.A. 16 : Showing caste of fish farmers

N (SF) = 60, N (LF) = 48

S. No.	Caste	Small fish farmer		Large fish farmer		Total	
		No.	%	No.	%	No.	%
1.	Thakur	3	5.01	2	4.66	5	4.64
2.	Lonia	1	1.66	-	-	1	0.08
3.	Kurmi	5	8.34	4	8.34	9	8.34
4.	Mallah	37	61.66	33	68.74	70	64.82
5.	Harijan	14	23.34	9	18.74	23	21.28
	Total	60	100.00	48	100.00	108	100.00

Table IV.A. 17 : Showing comparison of caste of fish farmers

N (SF) = 60, N (LF) = 48

S. No.	Caste category	Small fish farmer	Large fish farmer	Total
1.	High Caste	3	2	5
2.	Backward caste	43	37	80
3.	Scheduled caste	14	9	23
	Total	60	48	108

$x^2 = 0.42$, DF = 2, Non-significant at 0.05% level of significant.

Table IV. A.18 : Distribution of fish farmers according to education level.

S. No.	Fish seed size and stocking Education Level	Small fish farmer		Large fish farmer		Total	
		No.	%	No.	%	No.	%
1.	Illiterate	18	28.14	7	12.4	25	20.83
2.	Can read and Write	7	10.95	5	8.94	12	10.01
3.	Upto Basic School	8	12.4	4	7.15	12	10.01
4.	Upto Junior High School	14	21.87	19	33.94	33	27.4
5.	Upto High School	9	14.05	11	19.65	20	16.66
6.	Upto Intermediate	8	12.6	8	14.28	16	13.34
7.	Graduation above	0	0.00	2	3.56	2	1.66
	Total	64	100.00	56	100.00	120	100.00

Table IV.A.19 : Showing comparison of Educational level of fish farmers.

S. No.	Educational categories	Small fish farmer	Large fish farmer	Total
1.	Higher	08	10	18
2.	Middle	23	30	53
3.	Lower	33	16	49
	Total	60	56	120

$x^2 = 0.55$, DF = 2, Significant at 0.05% level of significant.

Table IV.A.20 : Distribution of fish farmers according to their experience.

S. No.	Experience (Years)	Small fish farmer		Large fish farmer		Total	
		No.	%	No.	%	No.	%
1.	> 5 years	16	25.00	8	14.28	24	20.01
2.	5 - 10 years	38	59.374	35	62.51	73	60.84
3.	Above 10 years	10	15.626	13	23.22	23	19.18
	Total	64	100.00	56	100.00	120	100.00

Table IV.A.21 : Showing comparison of experience level of fish farmers.

N (SF) = 64, N (LF) = 56

S. No.	Experience Level	Small fish farmer	Large fish farmer	Total
1.	Higher (Above 10 years)	10	13	23
2.	Middle (5-10 years)	38	35	73
3.	Lower (< 5 years)	16	8	24
	Total	60	56	120

$x^2 = 2.65$, DF = 2, Significant at 0.05% level of significant.

Table IV.A.22 : Showing fish farming as main occupation or supplementary occupation of fish farmers.

S. No.	Occupation	Small fish farmer		Large fish farmer		Total	
		No.	%	No.	%	No.	%
1.	Fish farming as main occupation	20	31.24	18	32.15	38	31.68
2.	Fish farming as supplementary Occupation	44	68.76	38	70.75	82	68.34
	Total	64	100.00	56	100.00	120	100.00

Table IV.A.23 : Distribution of main occupation of fish farmers where fish farming was supplementary occupation.

N (SF) = 44, N (LF) = 38

S. No.	Main occupation	Small fish farmer		Large fish farmer	
		No.	Percentage	No.	Percentage
1.	Agrifculture	22	50.00 (34.374)	24	63.16 (42.87)
2.	Business	3	6.82 (4.692)	4	10.53 (7.15)
3.	Caste occupation	4	11.00 (6.251)	2	5.26 (3.56)
4.	Service	2	4.55 (3.124)*	-	-
5.	Fish from river	13	29.55 (20.30)	8	21.05 (14.28)*
	Total	44	100.00 (38.751)*	38	100.00 (67.75)*

Table IV.A.24 : Distribution of supplementary occupation where fish farming was main occupation

N (SF) = 20, N (LF) = 18

S. No.	Supplementary occupation	Small fish farmer		Large fish farmer	
		No.	Percentage	No.	Percentage
1.	Agrifculture	6	30.01 (9.376)	4	22.23 (7.15)
2.	Agricultural Labour	8	40.01 (12.502)	6	33.34 (10.72)
3.	Caste occupation	2	10.01 (3.124)	3	16.66 (5.37)
4.	Fish from river	4	20.00 (6.251)	5	27.77 (8.94)*
	Total	20	100.00 (31.251)*	18	100.00 (31.66)*

Table IV.A.25 : Showing size of land holding of fish farmers

N (SF) = 64, N (LF) = 56

S. No.	Size of land holding in hectares (Interval)	Small fish farmer		Large fish farmer		Total	
		No.	%	No.	%	No.	%
1.	0- 2	36	56.24	27	48.23	63	52.61
2.	2 - 4	12	18.76	16	28.56	28	23.34
3.	4 and above	4	6.24	5	8.94	9	7.51
4.	Landless	12	18.74	8	14.27	20	16.66
	Total	64	100.00	56	100.00	120	100.00

Table IV.A.26 : Showing comparison of land holding of fish farmers.

N (SF) = 64, N (LF) = 56

S. No.	Land holding	Small fish farmer	Large fish farmer	Total
1.	Lower land holding (0-2)	48	35	83
2.	Higherf land holding (2 and above)	16	21	37
	Total	64	56	120

$x^2 = 1.65$, DF = 1, Non-Significant at 0.05% level of significant.

Table IV. 27.A: Showing the family size of fish farmers.

N (SF) = 64, N (LF) = 56

S. No.	Family size (Interval)	Small fish farmer		Large fish farmer		Total	
		No.	%	No.	%	No.	%
1.	Small (2-5)	23	35.95	32	57.15	55	45.85
2.	Medium (6-9)	29	45.32	14	25.01	43	35.82
3.	Large (10-13)	12	18.74	10	17.85	22	18.34
	Total	64	100.00	56	100.00	120	100.00

Table IV.A.28 : Showing comparison of family size of fish farmers.

N (SF) = 64, N (LF) = 56

S. No.	Family size	Small fish farmer	Large fish farmer	Total
1.	Small (2 - 6)	23	32	55
2.	Big (6 - 13)	41	24	65
	Total	64	56	120

$x^2 = 4.58$, DF = 1, Significant at 0.05% level of significant.

Table IV.A.29 : Showing socio-economic status of fish farmers

S. No.	Intervals Socio-economic status (Scores)	Evaluation	Small fish farmers		Large fish farmers	
			No.	%	No	%
1.	0 - 10	Low	27	42.18	16	28.58
2.	10 - 20	Medium	34	53.14	30	53.56
3.	20 - 29	High	3	4.67	10	17.85
	Total		64	100.00	56	100.00

Table IV.A.30 : Showing Socio-economic status of fish farmers

N (SF) - 64, N (LF) - 56

S.No.	Score		S.No.	Score		S.No.	Score		S.No.	Score	
	SF	LF		SF	LF		SF	LF		SF	LF
1	7	22	17	16	13	33	12	11	49	19	6
2	3	16	18	9	14	34	7	21	50	20	37
3	16	15	19	3	11	35	12	12	51	19	51
4	6	11	20	5	15	36	13	7	52	19	43
5	4	13	21	6	7	37	15	11	53	6	54
6	8	6	22	11	21	38	9	8	54	24	48
7	5	11	23	13	17	39	11	8	55	16	49
8	4	23	24	15	8	40	4	14	56	16	52
9	6	5	25	16	15	41	18	13	57	23	-
10	7	11	26	15	22	42	16	17	58	17	-
11	3	16	27	8	16	43	8	7	59	16	-
12	6	4	28	13	6	44	15	12	60	11	-
13	4	12	29	9	13	45	13	9	61	17	-
14	12	15	30	14	22	46	14	16	62	7	-
15	3	13	31	5	7	47	18	13	63	14	-
16	3	21	32	22	8	48	19	11	64	12	-

z = 0.35, Non-significant at 5% level of significance.

IV.B. ECONOMICS OF COMMUNITY FISH FARMING.

The study of the effect of stocking density and stocking size on the production and economics of carp under semi intensive culture was conducted and comparison of economics between small ponds and large ponds were carried out. No such studies were carried earlier in the selected study area.

For comparing the economics of fish culture with different stocking sizes and stocking densities, the crops were grouped into four categories based on stocking density and stocking size, separately for small ponds and large ponds. For small fishponds, the four categories for rates and size were :

(A) Fry stage with stocking density 10,000-20,000/ha/year (SPA).

(B) Fry stage with stocking density 20,001 and above/ha/ year (SPB).

(C) Fingerling stage with stocking density 5,000-8,000/ ha/year (SPC).

(D) Fingerling stage with stocking density 8,001 and above/ha/year (SPD).

The four categories for large size ponds were at stocking rates and sizes :

(A) Fry stage with stocking density 10,000-20,000/ha/year (LPA).

(B) Fry stage with stocking density 20,001 and above/ha/ year (LPB).

(C) Fingerling stage with stocking density 5,000-8,000/ ha/year (LPC).

(D) Fingerling stage with stocking density 8,001 and above/ha/year (LPD).

Details of cost of production of fish under different stocking density and stocking size in C.F.F. system is given in Table IV.B.1.

1. Cost of production of fish under different stocking density and stocking size in community fish farming in small ponds

The costs of fish culture at the different stocking densities and stocking sizes in small fish farms are given in table IV.B.1.

The total fixed cost for the culture of carps in small ponds for the SPA, SPB, SPC and SP categories were Rs. 1037.21, Rs. 880.53, Rs. 1049.15 and Rs. 1028.69/ha/year, respectively. The sample average was Rs. 998.89/ha/year. These constitute 5.57 percent, 4.67 percent, 4.19 percent and 3.55 percent of total cost repectively. The total variable cost for the first group SPA was Rs. 17,570.14/ha/year, out of which 16.65 percent went towards the cost of feed; for the second group SPB, the total variable cost was Rs. 23,201.20/ha/year, of which 19.81 percent was spent to-

Table : IV.B.1

Details of cost of production of fish under different stocking density and stocking size in C.F.F. System of study area (Small Ponds)

S.No.	Particulars	Rs./ha/year in small ponds (SP)				
		SP-A Fry stage 10000-20,000	SP-B Fry stage 20,001 and above	SP-C Fingerlings 5,000-8,000	SP-D Fingerlings 8,001 and above	Average
1.	**Fixed Cost :** (i) Rent amount	951.55 (5.12%)	807.82 (3.36%)	962.51 (3.84%)	943.74 (3.27%)	916.42 (3.78%)
	(ii) Interest of fixed cost	85.65 (0.45%)	72.71 (0.31%)	86.64 (0.35%)	84.95 (0.28%)	82.47 (0.35%)
	A. Total Fixed Cost	1037.21 (5.58%)	880.53 (3.67%)	1049.15 (4.19%)	1028.68 (3.55%)	998.88 (4.10%)
2.	**Variable Cost** (i) Cost of lime	954.37 (5.14%)	1028.14 (4.28%)	989.05 (3.94%)	1060.95 3.67%)	1008.14 (4.18%)
	(ii) Cost of Manure	2765.64 (14.85%)	3191.26 (13.24%)	3293.74 (13.07%)	3434.37 (11.92%)	3171.26 (13.13%)
	(iii) Cost of Seed	1959.05 (10.52%)	2803.14 (11.63%)	4371.87 (17.35%)	4681.26 (16.26%)	3453.84 (14.28%)
	(iv) Cost of Feed	3099.05 (16.65%)	4768.14 (19.81%)	4993.76 (19.84%)	5693.76 (19.75%)	4638.66 (19.18%)
	(v) Cost of Hired Labour	1130.01 (6.06%)	1276.26 (5.31%)	1354.37 (5.36%)	1415.01 (4.92%)	1293.92 (5.36%)
	(vi) Cost of Family Labour	2780.01 (14.93%)	2840.62 (11.81%)	3103.12 (12.33%)	3177.51 (11.02%)	2975.31 (12.32%)
	(vii) Cost of Harvesting	1643.74 (8.84%)	2378.12 (9.87%)	1665.64 (6.62%)	2393.76 (8.32%)	2020.32 (8.35%)
	(viii) Other Expenses	815.64 (4.37%)	1724.37 (7.15%)	1031.24 (4.11%)	2092.51 (7.25%)	1415.95 (5.85%)
	(ix) Interest on Working Capital @ 16%	2423.61 (13.03%)	3200.15 (13.28%)	3328.44 (13.21%)	3831.86 (13.31%)	3196.01 (13.23%)
	B. Total variable Cost	**17570.14 (94.44%)**	**23201.20 (96.35%)**	**24131.27 (95.84%)**	**27780.97 (96.44%)**	**23173.39 (95.81%)**
	C. Total Cost (A+B)	**18607.35 (100%)**	**24081.71 (100%)**	**25180.43 (100%)**	**28809.68 (100%)**	**24172.37 (100%)**

Figures shown in brakets, shows the percentage of total cost of production.

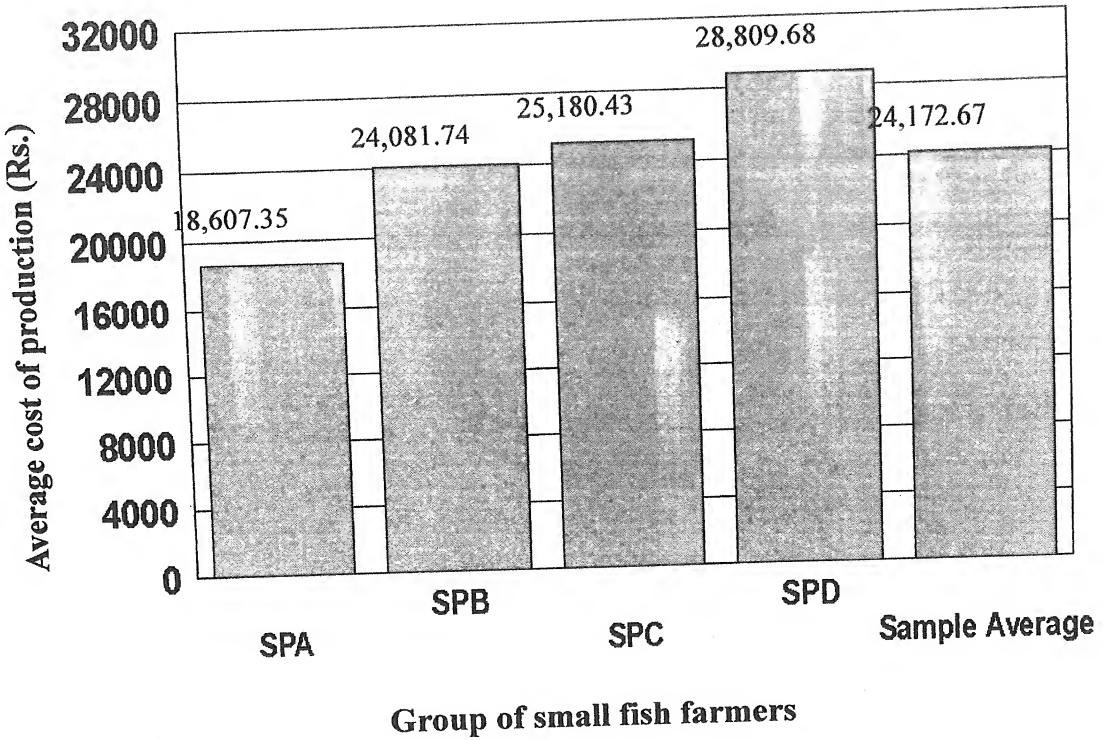

Figure IV.B.1 : Average cost of production (Rs.) in different stocking size and stocking density groups in small fish farmers in C.F.F. system during study period.

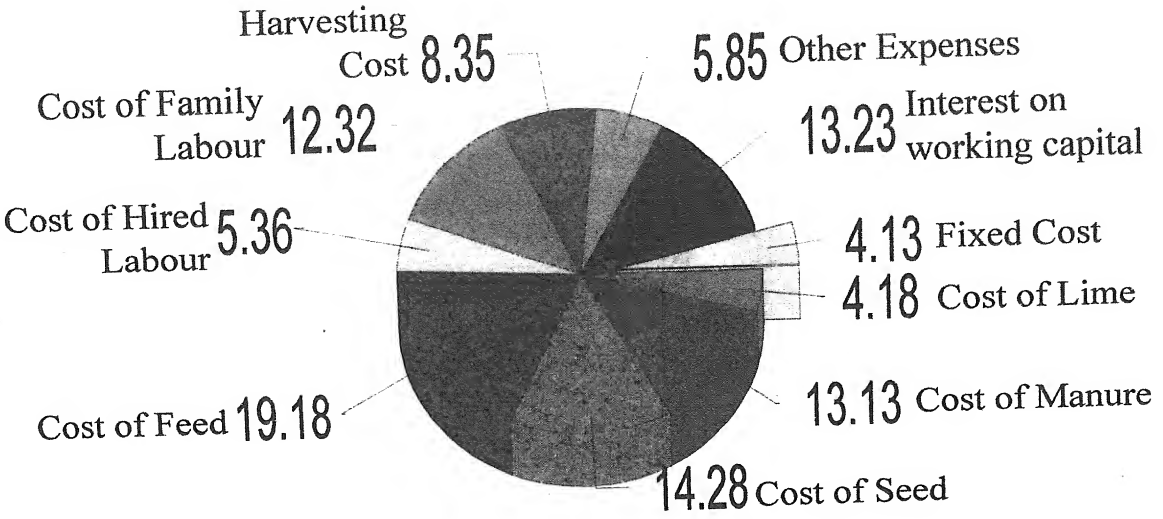

Figure IV.B.2 : Component wise cost of production in small ponds in study area during study period.

wards feed. Hence, it is evident that in same stocking size (fry stage) as the stockng density increased, the total variable cost also increased. It is also found that the cost of seed also increased from 10.52 pecent in case of SPA to 11.63 percent of SPB (Fig. IV.B.1).

The total variable cost for the third group SPC was Rs. 24,131.27/ha/year, out of which 19.84 percent went towards cost of feed; for the fourth group SPD, the total variable cost was Rs. 27,780.97/ha/year out of which 19.75 percent was spent towards feed. Hence, it is evident that in same stocking size (fingerlings) as the stocking density increase, the total variable cost also increase, but feeding cost slightly decreased in fourth group SPD because for proper management of fish ponds, the SPD fish farmers harvest fish in between the final harvast which help in decreasing the feeding cost in fourth group.

In case of 3rd and 4th groups, seed cost also increased, which were Rs. 4371.87 and Rs. 4681.26 respectively.

From the table (IV.B.1) it is found that the cost of manure increased but percentage of total cost of manure decreased with the stocking density. In case of fry stage stocking SPA and SPB, cost of manure was Rs. 2765.64/ha/year and Rs. 3191.24/ha/year respectively, which constituted 14.85 percent and 13.24 percent of the total cost respectively. This indicates that farmers pay more for supplementary feed than the manure, which help in plankton

production. In case of fingerling stocking of SPC and SPD groups, cost of manure increased with stocking density, which was Rs. 3293.74/ha/year and Rs. 3434.37/ha/year respectively, but the percentage of total cost was 13.07 and 11.92 respectively, decreased with stocking density.

The table revealed that the cost of hired labour and family labour both decreased with increased of stockng density. The cost of hired labour for SPA and SPB categories were Rs. 1130.01/ ha/year and Rs. 1276.26/ha/year respectively. These constituted 6.06 percent and 5.31 percent of the total cost respectively. The cost of hired labour for SPC and SPD categories were Rs. 1354.37/ ha/year and Rs. 1415.01/ha/year. These constituted 5.36 percent and 4.92 percent of the total cost respectively (Fig.IV.B.2).

The cost of family labour for SPA and SPB categories was Rs. 2780.01/ha/year and Rs. 2840.62/ha/year respectively. These constituted 14.93 percent and 11.81 percent of the total cost respectively. The cost of family labour for SPC and SPD were Rs. 3103.12/ha/year and Rs. 3177.51/ha/year respectively. These constituted 12.33 percent and 11.02 percent of total cost respectively.

Sample average of small farmers shows that the cost of feed is major share of the total cost, which was Rs. 4638.66/ha/year (19.18 percent of the total cost). It is followed by cost of seed, which was Rs. 3453.84 (14.28 percent of total cost) and manure

Rs. 3171.26 (13.13 percent of total cost).

Percent analysis reveals that variable cost accounts for more thatn 95 percent of the total cost while fixed cost constitute around 5 percent of the total cost because all the farmers used lands taken on lease.

2. Economics of community fish farming in small ponds.

The economics of carp culture with different size and stocking densities are presented in table IV.B.2. The average production of fish obstained from the SPA group was 1552.26 kg/ha, from SPB group 2374.01 kg/ha, from SPC group 2535.01 kg/ha and from SPD group 2974.01 kg/ha, showing that production increased with increase in stocking sizes and stockig densities (Fig. IV.B.3). The total returns obtained from SPA was Rs. 38,004.64/ha/year, Rs. 58,186.51/ha/year for SPD, with a net return of Rs. 19,398.33, Rs. 34,104.81, Rs. 36,952.61 and Rs. 44,027.91/ha/year respectively. This shows an increase in profitability with increase fingerling stage mortality rate of seed is lower than the fry stage and stocking density increase the profitability (Fig. IV.B.4).

It is observed that family labour income per year was Rs. 22,176.31, Rs. 36,594.56 for SPA, SPB, SPC, SPD and sample average respectively. Highest family labour income per year of Rs. 47,205.41 was obtained by SPD group fish farmers but the medium was received by SPA group fish farmers.

The input-output ratio is estimated to be 2.05, 2.43, 2.46 and 2.54 for each of the four group respectively. The average cost of production was Rs. 11.98, Rs. 10.15, Rs. 9.92 and Rs. 9.68 per kg of fish for first, second, third and fourth grops respectively (Fig. IV.B.5). These indicate that the cost of producing one kg of fish was cheaper with higher stocking density and bit stocking material (fingerling) compared to lower stocking density and small stocking material (fry) (Fig. IV.B.6).

From the above, it may be conclued that stocking size and stocking density plays an important role in successfulness of fish farmers. In this case, group four SPD, where stocking size is bigger (fingerling) and stocking density is high, profitability is also high.

3. Cost of production of fish under different stocking density and stocking size in community fish farming in large ponds during study period.

The costs of fish culture at the different stocking densities and stocking sizes in large fish farmers are given in table (IV.B.3).

The total fixed cost for the culture of carps in large ponds for the LPA, LPB, LPC and LPD categories were Rs. 1037.45, Rs. 1054.58, Rs. 1118.42 and Rs. 1062.67/ha/year, respectively. These constituted 4.93 percent, 3.96 percent and 3.38 percent of the total cost respectively. The average was Rs. 1064.39/ha/year (Fig. IV.B.7).

Table IV.B.2 : Economics of fish cultured under different stocking densities and stocking sizes in small ponds in C.F.F. system of study area during study period.

S. No.	Particulars	SP-A	SP-B	SP-C	SP-D	Average
1.	Yield (kg/ha)	1552.26	2374.01	2535.01	2974.01	2359.07
2.	Total Return (Rs./ha)	38004.64	58186.51	62135.01	73839.51	57790.91
3.	Total cost of production (Rs./ha)	18603.32	24082.71	25181.41	28809.61	24169.01
4.	Net Return (Rs./ha)	19398.33	34104.81	36952.61	44027.91	33620.15
5.	Family Labour Income (Rs./ha)	22176.31	36945.44	40055.72	47205.41	36595.72
6.	Input-Output ratio	2.045	2.43	2.46	2.54	2.37
7.	Cost of production (Rs./kg)	11.98	10.15	9.92	9.68	10.43

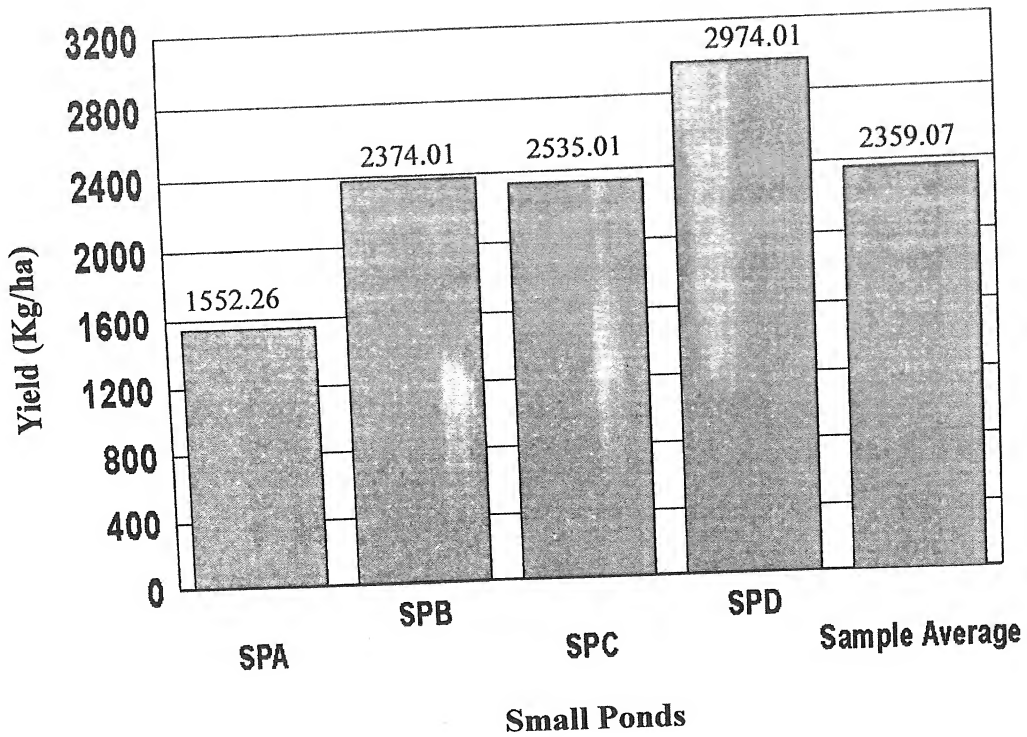

Figure IV.B.3 : Average Yield of fish in small ponds in study area (kg/ha) during study period.

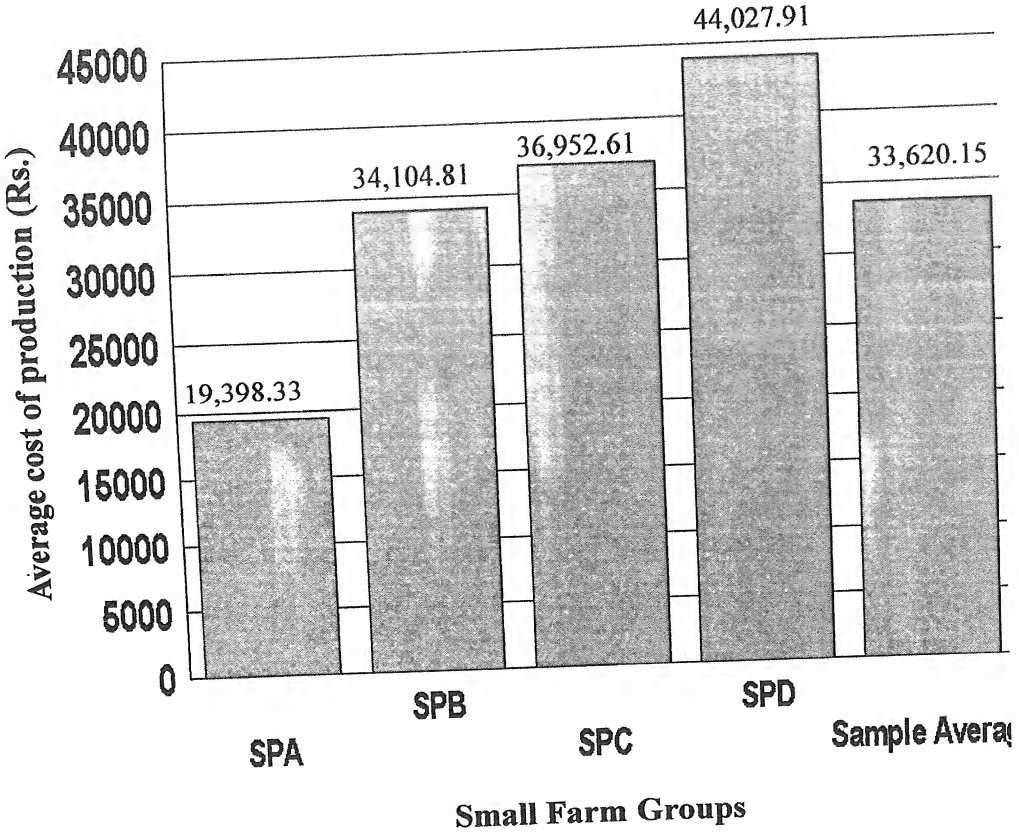

Figure IV.B.4 : Average net return (Rs.) from different stocking sizes and stocking densities groups in small fish farms of C.F.F. system during study period.

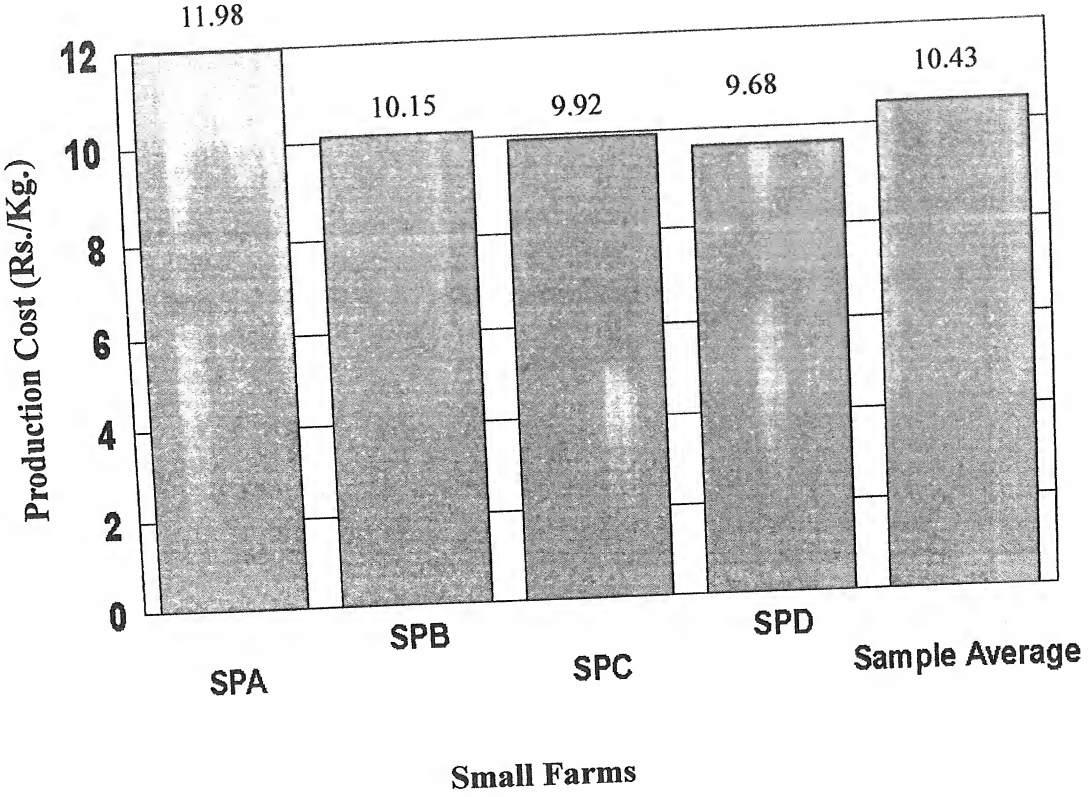

Figure IV.B.5 : Cost of production per kg of fish in small ponds (Rs./kg.) during study period.

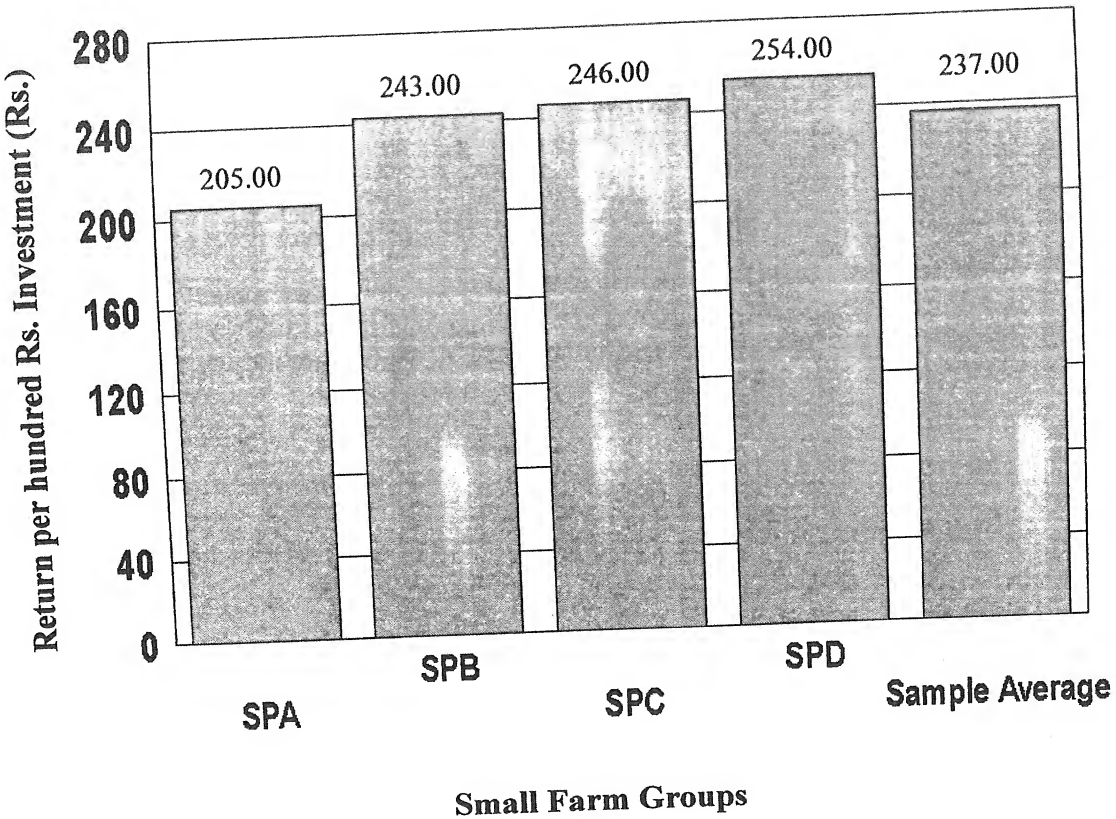

Figure IV.B.6 : Return per hundred rupees investment (Rs.) From small ponds of different stocking size and stocking density during study period.

The total variable cost worked out to Rs. 20,026.55, Rs. 25,557.11, Rs. 26,331.11 and Rs. 30,385.55/ha/year for four groups respectively, which constituted 95.08 percent, 96.05 percent, 95.95 percent and 96.63 percent of their total cost. Out of this 14.94 percent and 17.59 percent were used for feed for the first and second group. Hence, it is evident that in same stocking size (fry stage) as the stocking density increased, the feeding cost increased. It is also found that the cost of seed also increased from 8.91 percent in case of LPA to 10.48 percent in case of LPB (Fig. IV.B.8).

In case of 3rd and 4th group, 17.40 percent and 17.15 percent were used for feed. It is evident that in same stocking size (fingerling) as the stocking density increased, the cost of feed Rs. 4778.70/ha/year and Rs. 5388.72/ha/year respectively were increased, but the percentage of feeding cost slightly decreased in the fourth group LPD. This is because fish farmers harvest fish in between the final fish harvest which help in decreasing the feeding cost in fourth group.

In case of 3rd and 4th groups, seed cost also increased, which were Rs. 3541.08 and Rs. 4800.37/ha/year respectively.

From the table (IV.B.3) it is found that the cost of manure; Rs. 3387.51, Rs. 4127.51, Rs. 4201.08 and Rs. 4676.78/ha/year respectively and constitute 16.09, 15.31, 15.31 and 14.86 percent of the total cost respectively. In both the stocking size,

increaseing of stocking density, decrease in the percentage of total cost for manures is found, which indicates that farmers pay more for supplementary feed than manure which help in plankton production, when stocking density is increased.

The table points out the cost of hired labour and family labour both decreased with increase of stocking density. The cost of hired labour for LPA and LPB categories were Rs. 1902.08 and Rs. 2334.35/ha/year respectively. These constituted 9.02 percent, 8.78 percent of the total cost respectively. The cost of hired labour for LPC and LPD categories were Rs. 2386.06 and Rs. 2708.28/ha/year. These constituted 8.68 percent and 8.62 of the total cost respectively.

The cost of family labour for LPA and LPB categories were Rs. 2882.85 and Rs. 2960.72/ha/year respectively. These constituted 13.68 and 11.13 percent of the total cost respectively. The cost of family labour for LPC and LPD were Rs. 3114.28 and Rs. 3394.28/ha/year respectively. These contituted 11.34 and 10.78 percent of total cost respectively.

Average of large farms shows that the cost of feed is mjor share of the total cost, which was Rs. 4499.17/ha/year (16.88 of the total cost). It is followed by cost of manure, which was Rs. 4098.22 (15.39 percent of total cost) and seed Rs. 3253.38 (12.20 percent of total cost).

Present analysis reveals that variable cost accounts for more

Table : IV.B.3

Details of cost of production of fish under different stocking density and stocking size in C.F.F. System of study area (Large Ponds) during study period

S.No.	Particulars	Rs./ha/year in large ponds (SP)				
		LP-A Fry stage 10000-20,000	LP-B Fry stage 20,001 and above	LP-C Fingerlings 5,000-8,000	LP-D Fingerlings 8,001 and above	Average
1.	**Fixed Cost :** (i) Rent amount	951.78 (4.51%)	967.51 (3.62%)	1026.08 (3.73%)	974.94 (3.11%)	976.51 (3.65%)
	(ii) Interest of fixed cost	85.67 (0.42%)	87.07 (0.34%)	92.34 (0.35%)	87.73 (0.27%)	87.88 (0.34%)
	A. Total Fixed Cost	1037.45 (4.93%)	1054.58 (3.96%)	1118.42 (4.08%)	1062.67 (3.38%)	1064.39 (3.99%)
2.	**Variable Cost** (i) Cost of lime	1228.94 (5.84%)	1309.78 (4.91%)	1152.28 (4.18%)	1260.02 4.02%)	1237.74 (4.63%)
	(ii) Cost of Manure	3387.5 (16.09%)	4127.51 (15.31%)	4201.08 (15.31%)	4676.78 (14.86%)	4098.22 (15.39%)
	(iii) Cost of Seed	1877.85 (8.91%)	2794.28 (10.48%)	3541.08 (12.91%)	4800.37 (15.25%)	3253.38 (12.20%)
	(iv) Cost of Feed	3145.72 (14.94%)	4683.51 (17.58%)	4778.70 (17.40%)	5388.72 (17.15%)	4499.17 (16.88%)
	(v) Cost of Hired Labour	1902.08 (9.02%)	2334.35 (8.78%)	2386.06 (8.68%)	2708.28 (8.62%)	2332.68 (8.74%)
	(vi) Cost of Family Labour	2882.85 (13.68%)	2960.72 (11.13%)	3114.28 (11.34%)	3394.28 (10.78%)	3088.05 (11.58%)
	(vii) Cost of Harvesting	1890.08 (8.98%)	2566.13 (9.63%)	2384.45 (8.68%)	2593.78 (8.27%)	2358.62 (8.87%)
	(viii) Misc. Expenses	949.28 (4.52%)	1272.94 (4.77%)	1141.28 (4.18%)	2372.16 (4.37%)	1183.92 (4.45%)
	(ix) Interest on Working Capital @ 16%	2762.28 (13.12%)	3527.89 (13.26%)	3631.89 (13.24%)	4191.18 (13.33%)	3528.27 (13.25%)
	B. Total variable Cost	**20026.55 (95.08%)**	**25577.11 (96.05%)**	**26331.11 (95.95%)**	**30385.55 (96.63%)**	**25580.05 (96.02%)**
	C. Total Cost (A+B)	**21064.00 (100%)**	**26631.69 (100%)**	**27449.53 (100%)**	**31448.22 (100%)**	**26644.44 (100%)**

Figures shown in brakets, shows the percentage of total cost of production.

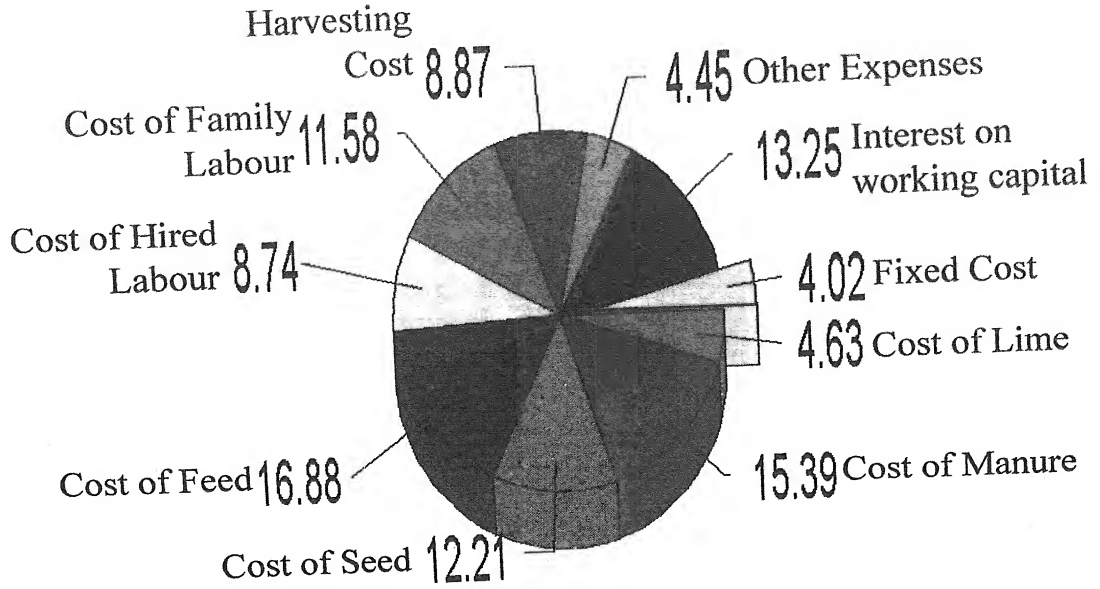

Figure IV.B.7 : Component wise cost of production in large ponds in study area

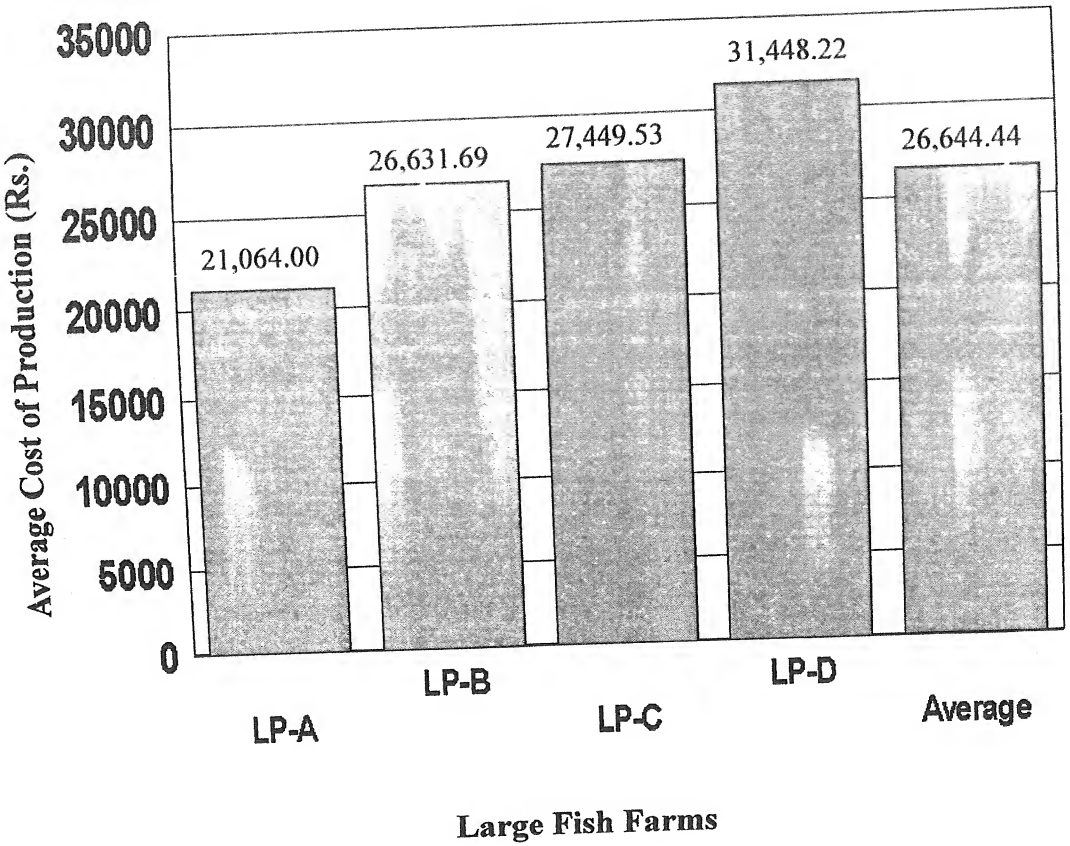

Figure IV.B.8 : Average cost of production (Rs.) in different stocking size and stocking density groups in large fish farms in C.F.F. system during study period.

than 95% of the total cost while fixed cost constitute merely around 5% of the total cost because all the farmers use ponds taken on lease.

4. Economics of community fish farming in large ponds during study period.

The economics of carp culture with different size and stocking densities are presented in table (IV.B.4). The average production of fish obtained from the LPA group was 1526.01 kg/ha. from LPB group 2144.10 kg/ha. from LPC group 2666.10 kg/ha and from LPD group 3185.10 kg/ha, showing that production increased with increase in stocking sizes and stocking densities (Fig. IV.B.9). The total returns obtained from LPA was Rs. 37,363.51/ha/year, Rs. 52,553.52, for LPB, Rs. 65,292.51/ha/year for LPC and Rs. 78,058.10/ha/year for LPD, with a net return of Rs. 16,297.48, Rs. 25,922.80, Rs. 37,843.97 and Rs. 46,609.85/ ha/year respectively. This shows an increase in profitability with increase in stocking size as well as stocking density because in fingerling stage mortality rate of seed is lower than the fry stage and stocking density increase the profitability (Fig. IV.B.10).

It is observed that family labour income per year was Rs. 19,182.32, Rs. 28,880.54, Rs. 40,958.26, Rs. 50,004.16 and Rs. 34,756.32 for LPA, LPB, LPC, LPD and average respectively. The highest famlity labour income per year of Rs. 50,004.16 was obtained by LPD group fish farmers but minimum was received

by LPA group fish farmers.

The input-output ratio is estimated to be 1.76, 1.98, 2.37 and 2.49 for each of the four groups respectively. The average cost of production was Rs. 13.80, Rs. 12.41, Rs. 10.94 and Rs. 9.88 per kg of fish for 1st, 2nd, 3rd and 4th groups respectively (Fig. IV.B.11). These indicate that the cost of producing one kg of fish was cheaper with higher stocking density and bit stocking materal (fingerling) compared to lower stocking density and small stocking material (fry).

From the above, it may be concluded that stocking size and stocking density plays in important role in successfulness of fish farmers. In case of large pond, stocking size plays more important role. Big stocking material (fingerling) fetch more money (Fig. IV.B.12).

Table IV.B.4 : Economics of fish cultured under different stocking densities and stocking sizes in large ponds in C.F.F. system of study area during study period.

S. No.	Particulars	LP-A	LP-B	LP-C	LP-D	Average
1.	Yield (kg/ha)	1526.10	2144.10	2666.10	3185.10	2380.35
2.	Total Return (Rs./ha)	37363.53	52553.52	65291.51	78058.10	58316.12
3.	Total cost of production (Rs./ha)	21065.04	26632.62	27448.53	31447.15	26648.34
4.	Net Return (Rs./ha)	16297.48	25922.80	37843.97	46609.85	31668.25
5.	Family Labour Income (Rs./ha)	19182.32	28880.54	40958.26	50004.16	34756.32
6.	Input-Output ratio	1.76	1.98	2.37	2.49	2.15
7.	Cost of production (Rs./kg)	13.80	12.41	10.94	9.88	11.75

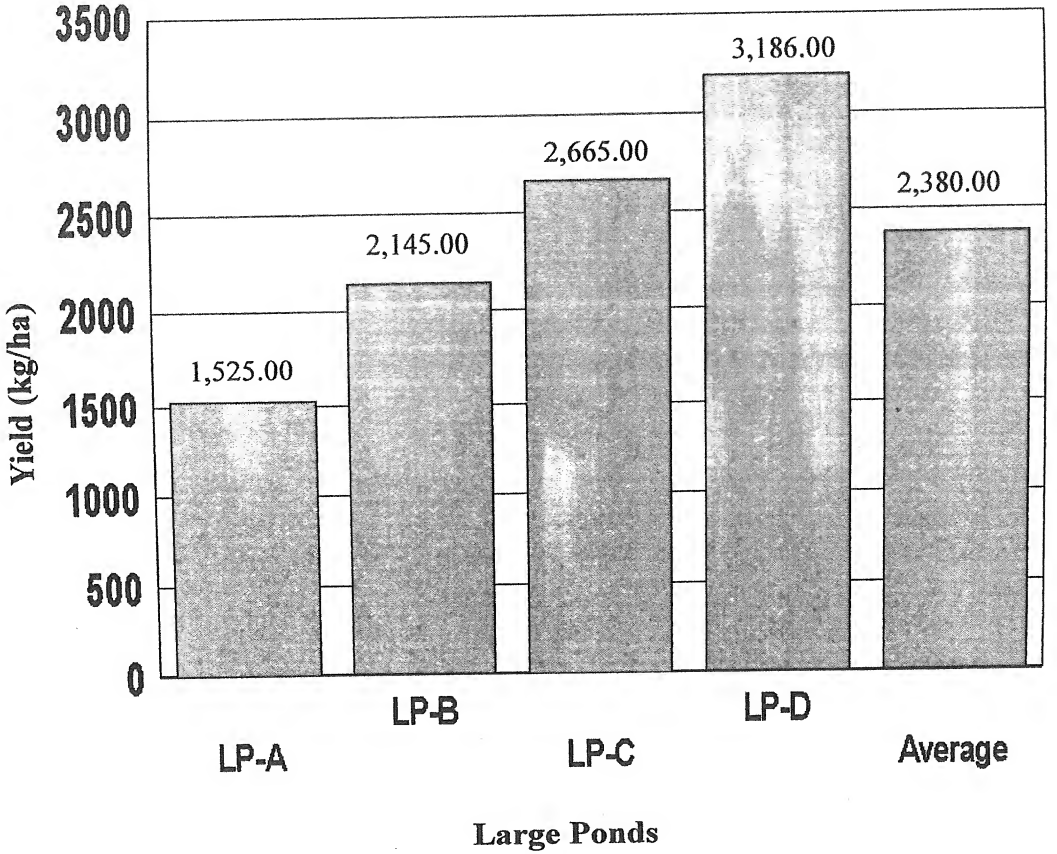

Figure IV.B.9 : Average yield of fish in Large Ponds in Stuy Area (Kg/ha) during study period.

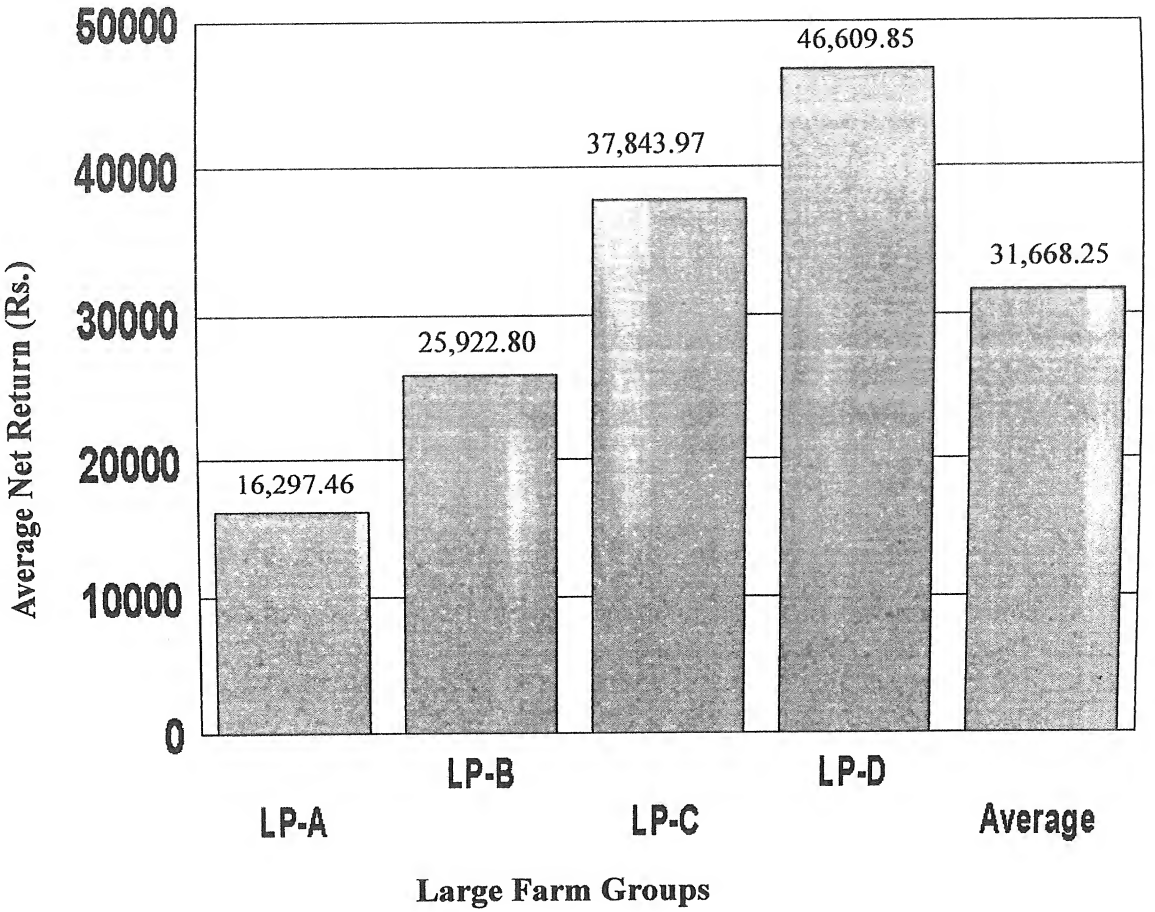

Figure IV.B.10 : Average Net return (Rs.) from different stocking sizes and stocking densities groups in large fish farms of C.F.F. system during study period.

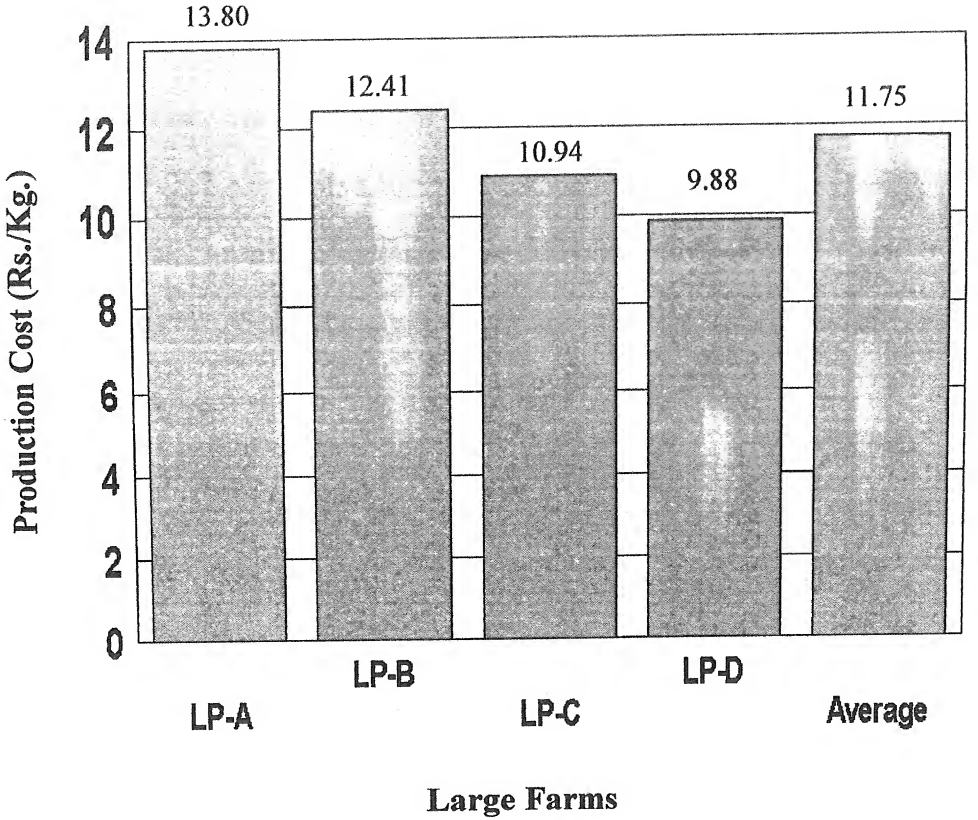

Figure IV.B.11 : Cost of production per kg of fish in Large ponds (Rs./kg.) during study period.

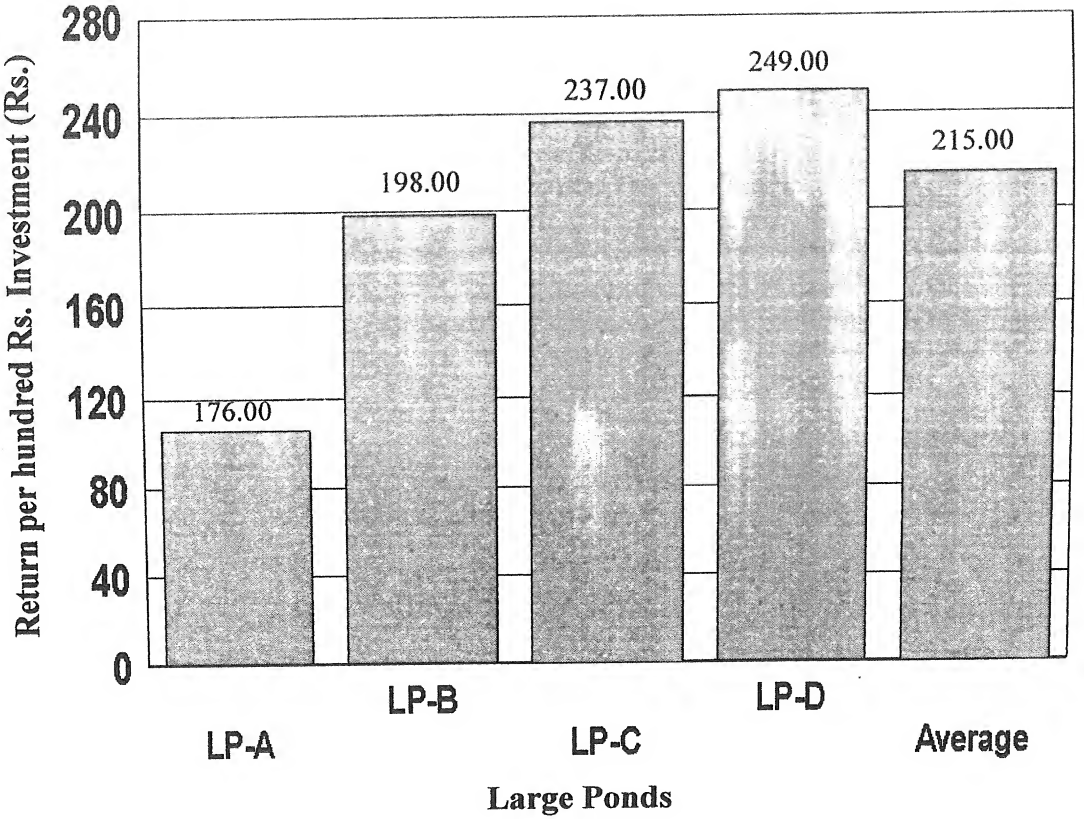

Figure IV.B.12 : Return per hundred rupees investment (Rs.) From Large ponds of different stocking size and stocking density during study period.

IV C : PROBLEMS OF CFF IN THE STUDY AREA

1. Problem as perceived by fish farmers in C.F.F. system.

The blocks of Gonda district, selected for study purpose endowed with natural resources and human skills for taking up intensive fish culture, but the gap between the actual and potential yield continues to persist. The new technology, which seems technically feasible, has failed to produce substantial results in the field condition. Problems in community fish farming system as perceived by the farmers are given in the table IV.C.1.

Table IV.C.1 charts out the major problems in C.F.F. system as perceived by the fish farmers. "Non availability of credit" has been perceived by the fish farmers as the most important porblem (31.2 percent of the total weightage) in C.F.F. system. The second most important problem as perceived by the fish farmers was "lack of knowledge" (16.2 percent) in adopting the carp culture technology. "Erratic supply of quality fish seed" (15.2 percent) (especially exotic carps, viz. Silver carp, Grass carp and Common carp) at reasonable price and specific time poses a serious constraint in rural areas. Most of the farmers use fish seeds with the mixture of Catla, Rohu and Mrigal and small sized seeds (fry stage/early fry stage) collected from various hetcheries, are being directly stocked in ponds resulting in poor survival. This has been perceived as the third important problem (15.2 percent

perceived by the farmers.

Table IV.C.1 shows that "high cost of inputs" (8.7 percent) and "low and fluctuating price of fish at farm gate" (7.6 percent) has been perceived as fourth and fifth problems in C.F.F. system.

"Poaching" (5.1 pecent) was also considered a major inhibiting factor ranked sixth in position. "Lack of suitable organised market" (4.5 percent), 'Non retention of water throughout the year' (4.1 percent), "Fish diseases" (4.1 percent) and "Poisoning of ponds" (3.5 percent) have been perceived as common problem in C.F.F. system.

2. Analysis of problems with root cause in C.F.F. system

Table IV.C.2 reflects the analysis of problem with root cause. The problems are grouped into five subsections, viz :

(a) Basic input/resources,

(b) Financial constraints,

(c) Marketing constraints,

(d) Extension gap, and

(e) Social constraints.

Table IV.C.2 points out the financial constraints (39.8 percent) as major problem in community fish farming system. Main root causes are clarified in column 3. The Banks require project prepared by the farmers, who are by and large uneducated and ill

Table IV.C.1 : Problems in C.F.F. system as perceived by the fish farmers.

S. No.	Particulars	Total Score	Percentage of total score	Rank Order
1.	Non availability of credit	225	31.2	I
2.	Lack of knowledge about technology	115	16.2	II
3.	Erratic supply of quality fish seed	112	15.2	III
4.	High cost of input	64	8.7	IV
5.	Low and fluctuating price at farm rate	55	7.6	V
6.	Poaching in ponds	35	5.1	VI
7.	Lack of suitable organised market	33	4.5	VIII
8.	Non retention of water throughout the year	31	4.1	VIII
9.	Fish disease	28	4.1	IX
10.	Poisoning of pond	25	3.5	X
	Total	**723**	**100**	

informed. Further, the fish farmers are often landless daily wage labourers who have nothing to offer as security for loan from Bank. Extension gap (20.2 percent) ranked 2nd in position. Extention of scientific methods to rural areas still remains large land inadequate. The farmer is either inadequately trained without practical based training programme or not trained at all. Multi-ownership and unwillingness hampers the acceptance of modern technology. Fish farmers are unaware about fish diseases.

The third most important constrains is availability of basic input/resources (19.4 percent) and root causes are discussed in column 3. Lack of exotic carp seed hatcheries has compelled the farmers in rural areas to resort to culture employing indigenous carps only (Fig. IV.C.1).

Large ponds invariably have predatory fish population, the control of which is not feasible through de-watering of using fish toxicant since these ponds are mainly meant for multi-purpose use. Yet they are stocked with fry, the chance of survival of which is very meagre and consequently they do not yield much. Most of the fish farmers used seed with the mixture of Catla, Rohu and Mrigal because hetcheries supply the mixture seed.

Water level decline in ponds during summer months and most of the farmers use pond water for irrigation of different crops.

The main marketing problems (11.8 percent) mentioned by the farmers were lack of infrastructural facilities like cold stor-

age, good approach roads from landing sites to marketing centres and quick transport. The fish markets are controlled by powerful groups of midlemen who buy from the producers at low price at farm gate (Fig. IV.C.2).

In social constrainst (8.5 percent) poaching and poisoning by organised dacoties have become a serious problem. Lack of proper monitoring is main cause of poaching. Economic competition among farmers is the root cause of poisoning of ponds.

Table IV.C.2 : Analysis of problem with root cause in C.F.F. system during study period.

S. No.	Types of Problems	Root Cause	Score/%	Rank order
1	2	3	4	5
1.	**Financial constraints :**			
	a. Non availability of credit	a. Fish farmers are unable to prepare project which is require by Banks	286 (39.8)	I
	b. High cost of inputs	b. Have nothing to offer as security of loan from Banks		
		c. Paucity of local distribution of inputs		
2.	**Extension Gap :**			
	a. Lack of knowledge about technology	a. Lack of practical base training programme	146 (20.2)	II
	b. Fish disease	b. Lack of suitable demonstration unit		
		c. Multi-ownership and unwillingness hampers the acceptance of modern technology		
		d. Unawareness about fish diseases		
		e. Lack of proper up-keep of ponds		
3.	**Constraints in availability of basic input/resources**			
	a. Erratic supply of quality fish seeds	a. Lack of exotic carp seed hatchery and low number of carp seed hatchery	141 (19.4)	III
	b. Non retention of water	b. Soil conditions, heavy evaporation		
		c. Lack of refilling sources		
		d. Pond water used for irrigation of different crops during summer months		
4.	**Marketing problem :**			
	a. Lack of suitable and organised market	a. Fish markets are controlled by middlemen	85 (11.8)	IV
	b. Low and fluctuating price at farm gate			
5.	**Social constraints :**			
	a. Poaching in ponds	a. Great demand of fish	61 (8.5)	V
	b. Poisoning of ponds	b. Proper monitoring		
		c. Economic competition		

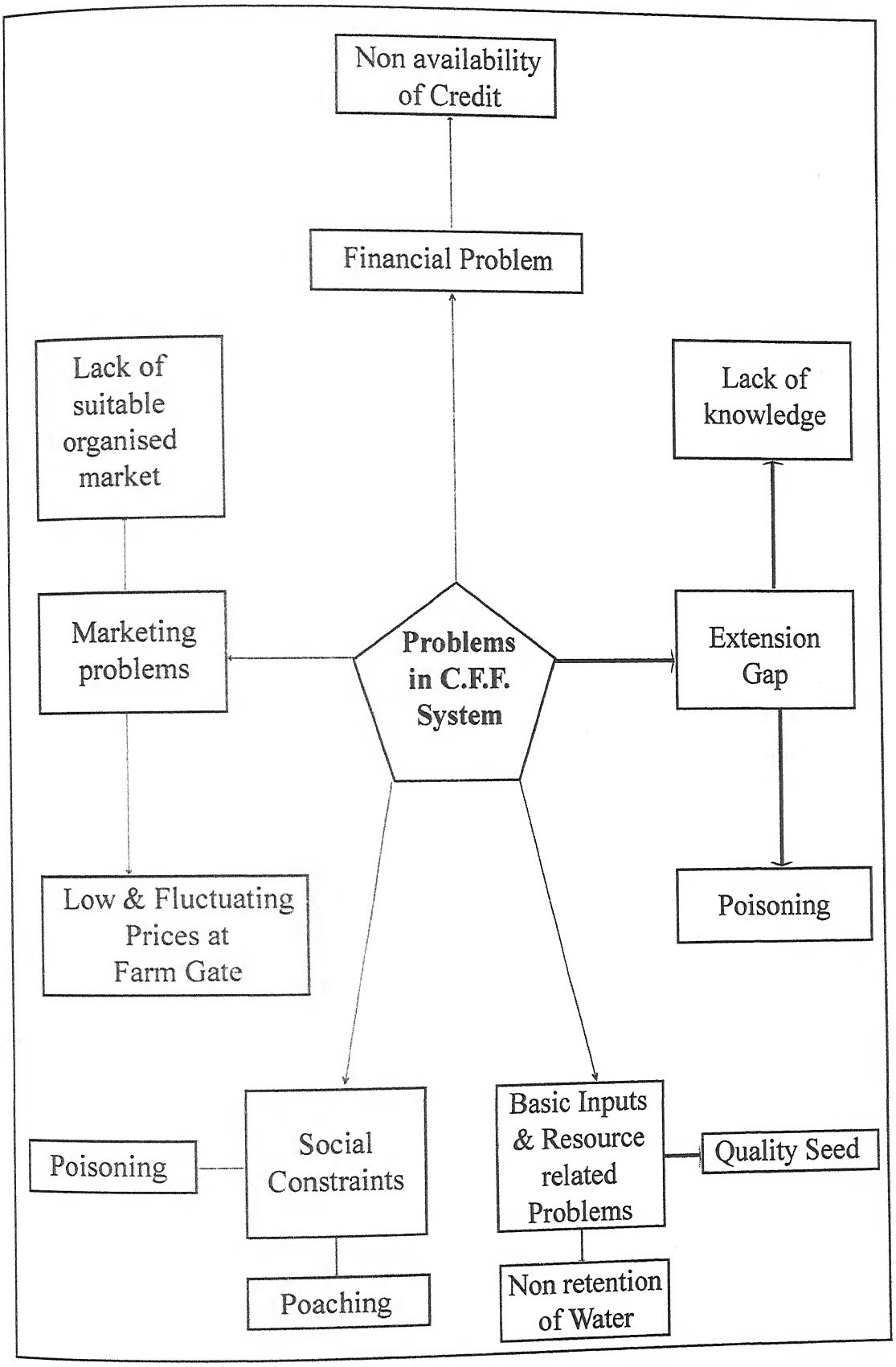

Fig. IV. C.1 : Problem Tree Analysis

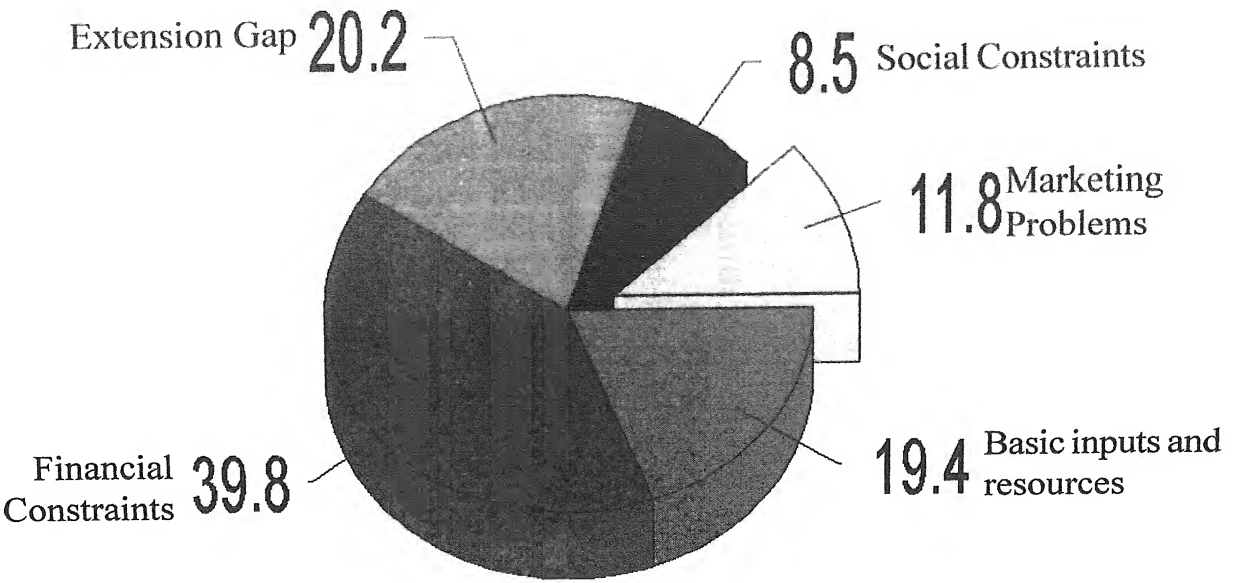

Fig.IV.C.2 : Problems faced by fish farmers.

3. Measures suggested by the fish farmers in increasing the yield of fish.

Table IV.C.3 indicates the suggested measures. The fish farmers suggested "Provision of Credit" (29.15 percent) to purchase the necessary inputs as the prime requisite in the process of adoption of high yielding technology. The Banks or other financial Insititutions need to float liberal credit policies to support fish farmers in a big way.

More exposure to technology (25.10 percent) ranked second suggested measure. Knowledge regarding maintenance of ponds hygiene and fish health care merits a special attention in making aquaculture a profitable venture (Fig. IV.C.3).

To gear up the fisheries extension services that we require not only strengthening by way of additional suitably trained manpower, but also regular provision of additional publicity material. This also points out the gross inadequacy of present day extension services in fish farming, especially in rural areas.

Provision of adequate "quality carp seed" (17.52 percent) for fish culture forms the third important priority measure suggested by them. The finding underlines the need for producing more seed of exotic carps to fill the gap. Perhaps good quality carp seeds could be attained by training the farmers to rearing fry in their own nursery ponds.

Among the measures suggested by the fish farmers, "Marketing through organised sector" (15.84 percent) rank fourth. Organised arrangements for storage and marketing of fish are necessary and would be helpful in stabilising price structure to benefit both the producers and consumers. Efficient co-operative marketing organisations may minismise and ultimately do away the vicious circle of the middlemen. The fish farmers may take up the operation without any uncertainty associated with prices.

The fish farmers considered the control of poaching and poisoning of ponds as the fifth important measure favouring culture of fish. Social awareness and educating the villagers, especially the young force, might reduce the intensity of the problem. Formation of resistence groups consisting of members of Panchayats, fishermen co-operative societies and fishes farmer clubs to keep constant vigil of the water area. It may be helpful if bushy plant material is put inside ponds to prevent easy netting. Hooks attached to the bottom of boat, rowed in water, might locate gill nets, hook and lines if any put by poachers. Training watchdogs may prove more effective and economical in controlling poaching.

Table IV.C.3 : Measures suggested by the fish farmers in increasing the yield of fish.

S. No.	Suggested Measures	Frequency	Frequency Percentage	Rank Order
1.	Provision of credit for fish culture	104	29.15	I
2.	More exposure to technology	91	25.10	II
3.	Supply of good quality of carp seed	67	17.52	III
4.	Marketing through organised sector	56	15.84	IV
5.	Control of poaching and poisoning	46	12.51	V
	Total	**360**	**100**	

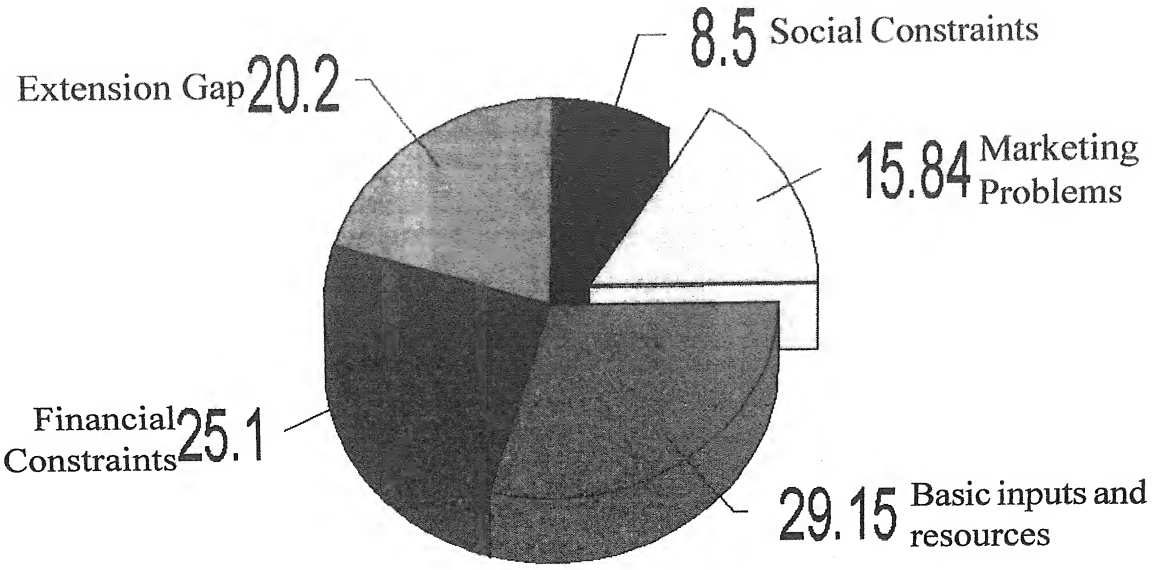

Fig.IV.C.3 : Measures suggested by the farmers.

Chapter-V

SUMMARY

V. A : FINDINGS

V. B : CONCLUSIONS

V. C : RECOMMENDATIONS

This chapter deals with the review of problems, objectives, hypothesis, the research methodology and summary of major findings and conclusions based upon them. In addition, recommendations have also been made to ecomonically viable and problem free.

The purpose of the present study was the analyse of the economic of community fish farming of selected villages in Pandri Kripal, Itiathoke and Mujehana blocks of Gonda district.

Efforts were also made to identify the problems in community fish farming system.

Problem.

There is need to evaluate the economics of community fish farming system in three blocks of Gonda district and identify the major problem in C.F.F. system, so that suitable measures for its greater adoption may be suggested.

Objectives of the study.

Based on the problem, the following objectives were framed for the study :

1. To examine the present status of community fish farming (C.F.F.) practices, that exist in the study area.
2. To estimate the economic benefites to be derived from the C.F.F. system on different size of fish ponds in the study area;
3. To estimate the input-output ratio of different size of

fish ponds in the study area; and

4. To identify the major problems faced by fish farmers and their suggestive measures.

Hypothesis.

(a) Traditional fish farming practices are existing in the study area.

(b) Success of fish farming is the source of encouragement to the local people to increased their additional income.

Material and Methods.

Pandrikripal, Itiathoke and Mujehana blocks of Gonda district were selected purposively for the present study. Sufficient number of community fishponds (both small and large) existed in these blocks.

A set of 64 small fish farmers (having below 1 ha pond) and 56 large farmers (having above 1 hac. pond) were purposively selected as respondents from the forty-six villages of selected blocks.

The data were collected from respondents through personal interviews schedule by the researcher himself. Data thus collected, were tabulated, analysed and interpreted in the light of the objectives set up for the study.

Two types of statistical analysis were used, namely descriptive and inferential statistics. Descriptive statistics included range,

percentage and mean. Inferential statistics included 't'test, 'z' test, Pearson Product Moment Correlation Coefficient (r) and x^2 test. There were used to test the reliability and validity of scale and to test the significance of difference.

V.A : FINDINGS OF THE STUDY.

Findings of the study relating to present status of community fish farming practices, economics of community fish farming, input-output relation; major problems faced by fish farmers and their suggestive measures are summarised as follows :

I. Present status of community fish farming practices in Gonda district.

(A) Physical status of C.F.F. system of study area.

Total number of small ponds (below 1 ha) and large ponds (above 1 ha) surveyed were 64 and 56 respectively. Among small ponds 19 (29.68%) were shallow, 27 (42.185%) were medium and 18 (14.28%) were shallow, 15 (26.78%) were medium depth pond and 33 (58.93%) were deep pond. From the finding it is clear that 51 (42.51%) community ponds were deep and 42 (35.00%) community ponds were medium deep pond and 27 (22.51%) community ponds were shallow.

The total area under small community ponds under study area was 43.40 ha and average size of small pond was 0.67 ha. The total area under large community ponds surveyed was 97.96 ha and average size of large fishponds was 1.76 ha. Total sur-

veyed pond area was 141.35 ha.

In case of small ponds 14 (21.876%) were rainfed pond, 24 (37.6%) small ponds were ground water fed pond and 26 (40.626%) small ponds were canal fed ponds. In case of large community ponds 21 (37.6%) were ground water fed ponds, 18 (32.15%) were rainfed ponds and 17 (30.35%) were canal fed ponds.

On the basis of water retention the community ponds were classified as seasonal and perenial pond. Most of the small ponds 46 (71.876%) were seasonal and 18 (28.124%) were perennial ponds, whereas 33 (58.93%) large ponds were perennial and 23 (41.08%) were seasonal ponds.

From physical status discussed in this section, shows that community ponds were good for scientific fish culture.

(B) Cultural practices/managemental aspects of community fish farming system.

(1) Seed management practices in C.F.F. system :

(i) Seed collection.

Majority of small fish farmers 28 (43.76%) and 20 (35.7%) large fish farmers collect fish seed from hatchery. 16 (25.01%) of small fish farmers and 12 (21.44%) large fish farmers collect seed from river (Terhi). 20 (31.24%) of small fish farmers and 24 (42.85%) of large fish farmers buy seed from Hawker, who col-

lect seed from Ghaghra.

Majority of small farmers collects seed from local hatchery and majority of large fish farmers collects seed from Ghaghra river.

There was no significance difference between small and large fish farmers as regards their seed collection practice. Both collects fish seed from where seed is easily available and good in quality.

(ii) Stocking combination of fish seed.

Indian major crops (Catla, Rohu and Mrigal) are most popular stocking combination in C.F.F. system. Among exotic carps, only common carp is popular among both small and large fish farmers. 46 (71.876%) of small fish farmers and 30 (53.56%) of large fish farmers prefer the Indian major carp as stocking combination, i.e. 3-spp., combination. 18 (28.124%) small fish farmers and 22 large fish farmers prefer the 4-spp. combination. (3 Indian major carps and common carp fish spp.). Only 4 (7.14%) large farmers culture 6- sp. cobination (3 major carps and 3 exotic carps).

There was a significant difference between small and large fish farmers regarding their stocking combination. Large farmers keenly prefer exotic carps along with Indian major crap, as a stocking material.

(iii) Stocking density of fish seed.

16 (25.01%) of small fish farmers and 14 (25.01%) of large fish farmers stock try stage fish seed with stocking density of 10,00000-20,000/ha. 16 (25.01%) small and 14 (25.01%) large fish farmers stocks fry stage seed with 20,000 and above/ha capacity. 14 (25.01%) of large and 16 (25.01%) small fish farmers stocks fingerling stage fish seed with 5,000-8,000/ha capacity and 14 (25.01%) large and 16 (25.01%) small fish farmers stock fingerling stage of seed with 8,001 and above/ha capacity

There is no significant difference regarding stocking density and stocking size of fish seed in between small and large fish farmers.

(2) Feed and Feeding management practices in C.F.F. system.

(i) Types of feed used in C.F.F. system.

It was found that only 8 (12.6%) small fish farmers depended on natural fish food, i.e. plankton, which grows in pond water. They did not provide any supplementary food. 31 (48.45%) small fish farmers used rice bran/rice polish as supplementary food to fish and 25 (39.05%) small fish farmers use balanced supplementary feed, i.e. rice bran and mustard oil cake to their pond and fish feed. On the other hand, all large fish farmers provide supplemetary feed beside the plankton, which is natural food. Majority of large fish farmers 35 (62.4%) provide balanced supplementary feed, i.e. rice bran and mustard oil cake, which is

locally available fish feed. 21(37.4%) large fish farmers provide only rice bran/rice polish as fish feed.

There was no significance difference between small and large fish farmers as regards fish feed they use. Large fish farmers were more scientifically advance and particular in providing balanced diet to fish.

(ii) Feeding management.

Out of the small fish farmers only 56 fish farmers provide supplementary feed to fish. 8 small farmers depended on only natural fish food i.e. plankton.

Maximum number of 29 (51.98%) small fish farmers out of 56 and 31(55.37%) of large fish farmers prefered bag feeding method followed by bradcasting method which 23 (41.06%) small and 19 (33.94%) large fish farmers prefered. 4 (7.15%) small and 6 (10.72%) fish farmers used basket-feedings method.

(iii) Level of fish feed application.

Large fish farmers (1606.86 kg/ha) use more feed than the small fish farmers (1325.35 kg/ha). Small fish farmers use feed (53.02%) of recommended rate whereas large fish farmers use feed 64.26% of recommended rate.

(3) Manuring in community fish farming system.

(i) Types of manure used in C.F.F. system.

It was found that most of the small fishers 40 (70.31%)

and 42 (75.01%) large fish farmers manure their pond with cattle dung, which is easilly available in village. 14 (21.87%) small and 8 (14.28%) large fish farmers manure their pond with duck droppings and only 5 (7.80%) small fish farmers and 6 (10.72%) large fish farmers manure their pond with poultry litter.

There was no significant difference between small and large fish farmers as regards type of manure they used.

(ii) Level of manure applicatiion with their recommended rate.

It was found that small fish farmers used cattle dung 31.61% of recommended rate and large fish farmers use cattle dung 26.81% of recommended rate. In case of poultry litter small fish farmers used only 11.24% of recommended rate and large fish famers used 13.86 of recommended rate . In case of such dropping small fish farmers use 21.66% and large fish farmers 22.81% of recommended rate.

The community fish farmers use low amount of manure than recommended dose, because village ponds are rich in organic manure and in rainy season the load of organic matter increase.

(4) Liming to pond in C.F.F. system.

(i) Use of Lime in C.F.F. system.

The maximum number of large fish farmers 40 (71.42%)

and 31 (48.44%) small fish farmers occasionally use lime in their ponds. 19 (29.68%) small fish farmers and 10 (17.85%) large fish farmers use lime only at the time of pond preparation. Small number of large fish farmers 6(10.72%) and 14 (21.87%) small fish farmers use lime at regular interval.

There was no significant difference between small and large fish farmers as regards use of lime. Small fish farmers are more particular in using lime at regular intervals for maintaining proper pH level.

(ii) Level of manure application with their recommended doses :

It was found that large fish farmers use average 309.41 kg/ ha of lime in a year and percentage of recommeded doses was 15.46%. Small fish farmers use average doses of lime is 252.04 kg/ha/yr. in case of recommended dose was 12.61%.

(5) Harvesting.

(i) Nets used during the time of harvesting.

It was found that dragnets are commonly used by both small 44 (68.76%) and large 37 (66.06%) fish farmers. 20 (31.24%) small and 14 (25.01%) large fish farmers used Gill nets. Cast net was used only by a few number of large fish farmers 5 (8.94%).

These nets were used for commercial catch from ponds. Traps, hooks and lines were used for only catching few fish for

household use.

There was no significant difference between small and large fish farmers as regards nets. Large fish farmers used different types of net, viz. gill net, drag net and cast net.

(ii) Number of harvesting in single crop.

Majority of small fish farmers 28 (43.74%) harvested their produce 1 to 2 times, 24 (37.4%) small fish farmers harvested their produce 3 to 4 tiems in a year and 12 (18.74%) harvest more than 4 times for complete harvesting. On the other hand, 24 (42.87%) large fish farmers harvest fish more than 4 times and 18 (32.15%) large fish farmers harvest fish 1 to 2 times and 14 (25.01%) large fish farmers harvest fish 3 to 4 times in a year.

Small fish farmers harvest their produce 1 to 2 times because mostly they borrow nets on rent, and large fish farmers have their own net.

There was no significant difference between small and large fish farmers as regards number of netting.

(C) Socio-economic status of fish farmers of C.F.F. system.

(1) Age of fish farmers.

The highest number of small fish farmers 34 (53.124%) under middle age group people (30-50 years) and 32 (57.15%) large fish farmers were also under middle age group people. 22 (34.376%) and 18 (32.15%) small and large fish farmers respec-

tively were in young age group (20-35 years interval). 8 (12.5%) small fish farmers were under old age group (50.65 years), whereas 6 (10.71%) large fish farmers in the same group.

There was no significant difference between small and large fish farmers as regards their age. Both small and large fish farmers were middle-aged. It may be due to nature of fish farming as business. It requires lot of efforts and resources to establish the business. Therefore, comparatively older age and experience are required for fish farming business.

(2) Caste of fish farmers.

Out of 120 fish farmers 108 (90%) were Hindu in religion and 12 (10%) were Muslims in faith. The maximum number of small fish farmers and large fish farmers belonged to 'Mallah' community being 37 (61.67%) and 33 (68.74%) respectively. This was followed by Harijans, which were 14 (23.34%) among small fish farmers and 9 (18.474%), among large fish farmers. There are some other castes also, like Thakur, Lonia and Kurmi, which were in small in number among small and large fish farmers.

Therefore, it may be concluded that 'Mallah' caste is major caste among the small and large fish farmers. Lowest number of small and large fish farmers belonged to high caste that shows the breaking of the caste barrier.

There was no significant difference between small and large fish farmers as regards their caste. Mostly all of them belong to

'Mallah' caste.

(3) Education of fish farmers.

It was found that 18 (28.14%) small fish farmers were illiterate and a few number of small fish farmers 7 (10.95%) could read and write, whereas 7 (12.4%) large fish farmers were illiterate and 5 (8.94%) of large fish farmers could read and write. The maximum number of small fish farmers 14 (21.87%) had education level equal to Junior High School, followed by High School level 9 (14.05%), Primary School and upto Intermediate level 8 (12.4%) each. The maximum number of large fish farmers 19 (33.94%) had education level equal to Junior High School, followed by High School level 11 (19.65%), Intermediate level 8 (14.28%), Primary level 4 (7.15%) and only 2 (3.56%) large fish farmers had graduation level of education.

There was no significant difference between small and large fish farmers as regards their education. Large fish farmers had more education than small fish farmers.

(4) Experience of fish farmers.

Majority of small fish farmers 38 (59.374%) and 35 (62.51%) large fish farmers had 5-10 years experience in community fish farming. About 16 (25.00%) and 8 (14.28%) of small fish farmers and large fish farmers respectively had below 5 years experience. Small and large fish farmers there were 10 (15.626%)

and 13 (23.22%) respectively had experience above 10 years.

There was no significant difference between small and large fish farmers as regards their experience in community fish farming. Both had medium level of experience in C.F.F.

(5) Occupation of fish farmers.

In majority of cases, fish farming was supplementary occupation while for only 38 (31.67%) it was main occupation.

(6) Size of land holding of fish farmers.

Majority of the small fish farmers 48 (75%) and 43 (76.79%) large fish farmers was having land holding 0-4 hectares. There were small numbers of small fish farmers 4 (6.24%) and large fish farmers 5 (8.94%) who had land holding above 4 hectares. 12 (18.76%) small fish farmers and 8 (14.27%) large fish farmers were landless.

There was no significant difference between small and large fish farmers regarding their size of land holding.

(7) Family size of fish farmers.

It was found that 29 (45.32%) belonged to medium size family with 6-9 members. This was followed by small size family size (2-5 members). 23 (35.95%) of small fish farmers belonged to this category and 12 (18.74%) had large families (10-12 members).

In case of large fish farmers 32 (57.15%) belonged to small size family followed by 14 (25.01%) medium size and 10 (17.85%) large size family in case of large fish farmers.

There was significant difference between small and large fish farmers regarding their family size. Large fish farmers had the small family than small fish farmers.

(8) Socio-economic status of the fish farmers.

Majority of small fish farmers 34 (53.14%) and large fish farmers 30 (53.56%) had medium socio-economic status. This was followed by 27 (42.18%) small fish farmers and 16 (28.58%) large fish farmers who had low socio-economic status. There were 3 (4.67%) and 10 (17.85%) small and large fish farmers respectively had high range.

Therefore, we may conclude that most of the small and large fish farmers had medium socio-economic status.

There was no significant difference between small and large fish farmers regarding their socio-economic status.

II. Economics of Community fish farming

For comparing the economics of fish culture with different stocking sizes and stocking densities, the crops were grouped into four categories based on stocking density and stocking size, separately for small ponds and large ponds. For small fishponds, the four categories for rates and size were :

(A) Fry stage with stocking density 10,000-20,000/ha/year (SPA).

(B) Fry stage with stocking density 20,001 and above/ha/ year (SPB).

(C) Fingerling stage with stocking density 5,000-8,000/ ha/year (SPC).

(D) Fingerling stage with stocking density 8,001 and above/ha/year (SPD).

The four categories for large size ponds were at stocking rates an sizes :

(A) Fry stage with stocking density 10,000-20,000/ha/year (LPA).

(B) Fry stage with stocking density 20,001 and above/ha/ year (LPB).

(C) Fingerling stage with stocking density 5,000-8,000/ ha/year (LPC).

(D) Fingerling stage with stocking density 8,001 and above/ha/year (LPD).

1. Cost of production of fish under different stocking density and stocking size in community fish farming in small ponds.

Total fixed cost for the culture of carps in small ponds for

the SPA, SPB, SPC and SP categories were Rs. 1037.21, Rs. 880.53, Rs. 1049.15 and Rs. 1028.69/ha/year, respectively. The sample average was Rs. 998.89/ha/year. These constitute 5.57 percent, 4.67%, 4.19% and 3.55% of total cost respectively. The total variable cost for the first group SPA was Rs. 17,570.14/ha/year, out of which 16.65% went towards the cost of feed; for the second group SPB, the total variable cost was Rs. 23,201.20/ha/year, of which 19.81% was spent towards feed. Hence, it is evident that in same stocking size (fry stage) as the stockng density increased, the total variable cost also increased. It is also found that the cost of seed also increased from 10.52% in case of SPA to 11.63%.

The total variable cost for the third group SPC was Rs. 24,131.27/ha/year, out of which 19.84 % went towards cost of feed; for the fourth group SPD, the total variable cost was Rs. 27,780.97/ha/year out of which 19.75% was spent towards feed. Hence, it is evident that in same stocking size (fingerlings) as the stocking density increase, the total variable cost also incerease, but feeding cost slightly decreased in fourth group SPD because for proper management of fish ponds, the SPD fish farmers harvest fish in between the final harvast which help in decreasing the feeding cost in fourth group.

In case of 3rd and 4th groups, seed cost also increased, which were Rs. 4371.87 and Rs. 4681.26 respectively.

It is found that the cost of manure increased but percentage of total cost of manure decreased with the stocking density. In case of fry stage stocking SPA and SPB, cost of manure was Rs. 2765.64/ha/year and Rs. 3191.24/ha/year respectively, which constituted 14.85 percent and 13.24% of the total cost respectively. This indicates that farmers pay more for supplementary feed than the manure, which help in plankton production. In case of fingerling stocking of SPC and SPD groups, cost of manure increased with stockig density, which was Rs. 3293.74/ha/year an Rs. 3434.37/ha/year respectively, but the percentage of total cost was 13.07 and 11.92 respectively, decreased with stocking density.

The percentage of hired labour and family labour both decreased with increased of stockng density. The cost of hired labour for SPA and SPB categories were Rs. 1130.01/ha/year and Rs. 1276.26/ha/year respectively. These constituted 6.06 percent and 5.31% of the total cost respectively. The cost of hired labour for SPC and SPD categories were Rs. 1354.37/ha/year and Rs. 1415.01/ha/year. These constituted 5.36% and 4.92% of the total cost respectively.

The cost of family labour for SPA and SPB categories was Rs. 2780.01/ha/year and Rs. 2840.62/ha/year respectively. These constituted 14.93% and 11.81% of the total cost respectively. The cost of family labour for SPC and SPD were Rs. 3103.12/ha/year

and Rs. 3177.51/ha/year respectively. These constituted 12.33% and 11.02% of total cost respectively.

Sample average of small farms shows that the cost of feed is major share of the total cost, which was Rs. 4638.66/ha/year (19.18% of the total cost). It is followed by cost of seed, which was Rs. 3453.84 (14.28% of total cost) and manure Rs. 3171.26 (13.13% of total cost).

Present analysis reveals that variable cost accounts for more thatn 95 percent of the total cost while fixed cost constitute around 5 percent of the total cost because all the farmers used lands taken on lease.

2. Economics of community fish farming in small ponds.

The average production of fish obstained from the SPA group was 1552.26 kg/ha, from SPB group 2374.01 kg/ha, from SPC group 2535.01 kg/ha and from SPD group 2974.01 kg/ha, showing that production increased with increase in stocking sizes and stockig densities. The total returns obtained from SPA was Rs. 38,004.64/ha/year, Rs. 58,186.51/ha/year for SPD, with a net return of Rs. 19,398.33, Rs. 34,104.81, Rs. 36,952.61 and Rs. 44,027.91/ha/year respectively. This shows an increase in profitability with increase fingerling stage mortality rate of seed is lower than the fry stage and stocking density increase the profitability.

It is observed that family labour income per year was Rs. 22,176.31, Rs. 36,594.56 for SPA, SPB, SPC, SPD and sample

average respectively.

The input-output ratio is estimated to be 2.05, 2.43, 2.46 and 2.54 for each of the four group respectively. The average cost of production was Rs. 11.98, Rs. 10.15, Rs. 9.92 and Rs. 9.68 per kg of fish for first, second, third and fourth grops respectively (Fig. IV.B.5). These indicate that the cost of producing one kg of fish was cheaper with higher stocking density and bit stocking material (fingerling) compared to lower stocking density and small stocking material (fry).

Therefore, it may be conclued that stocking size and stocking density plays an important role in successfulness of fish farmers. In this case, group four SPD, where stocking size is bigger (fingerling) and stocking density is high, profitability is also high.

3. Cost of production of fish under different stocking density and stocking size in community fish farming in large ponds.

The fixed cost for the culture of carps in large ponds for the LPA, LPB, LPC and LPD categories were Rs. 1037.45, Rs. 1054.58, Rs. 1118.42 and Rs. 1062.67/ha/year, respectively. These constituted 4.93 percent, 3.96 percent and 3.38 percent of the total cost respectively.

The total variable cost worked out to Rs. 20,026.55, Rs. 25,557.11, Rs. 26,331.11 and Rs. 30,385.55/ha/year for four

groups respectively, which constituted 95.08 percent, 96.05 percnet, 95.95% and 96.63% of their total cost. Out of this 14.94% and 17.59% were used for feed for the first and second group. Hence, it is evident that in same stocking size (fry stage) as the stocking density increased, the feeding cost increased. It is also found that the cost of sedd also increased from 8.91% in case of LPA to LPB 10.48%.

In case of 3rd and 4th group, 17.40% and 17.15% were used for feed. It is evident that in same stocking size (fingerling) as the stocking density increased, the cost of feed Rs. 4778.70/ha/ year and Rs. 5388.72/ha/year respectively were increased, but the percentage of feeding cost slightly decreased in the fourth group LPD. This is because fish farmers harvest fish in between the final fish harvest which help in decreasing the feeding cost in fourth group.

In case of 3rd and 4th grops, seed cost also increased, which were Rs. 3541.08 and Rs. 4800.37/ha/year respectively.

It is found that the cost of manure; Rs. 3387.51, Rs. 4127.51, Rs. 4201.08 and Rs. 4676.78/ha/year respectively and constitute 16.09%, 15.31%, 15.31% and 14.86% of the total cost respectively.

In both stocking size, increaseing of stocking density, decrease in the percentage of total cost for manures is found, which indicates that farmers pay more for supplementary feed than

manure which help in plankton production, when stocking density is increased.

The percentage of total cost of hired labour and family labour both decreased with increase of stocking density. The cost of hired labour for LPA and LPB categories were Rs. 1902.08 and Rs. 2334.35/ha/year respectively. These constituted 9.02%, 8.78% of the total cost respectively. The cost of hired labour for LPC and LPD categories were Rs. 2386.06 and Rs. 2708.28/ha/year. These constituted 8.68% and 8.62% of the total cost respectively.

The cost of family labour for LPA and LPB categories were Rs. 2882.85 and Rs. 2960.72/ha/year respectively. These constituted 13.68% and 11.13% of the total cost respectively. The cost of family labour for LPC and LPD were Rs. 3114.28 and Rs. 3394.28/ha/year respectively. These contituted 11.34% and 10.78% of total cost respectively.

Average of large farms shows that the cost of feed is mjor share of the total cost, which was Rs. 4499.17/ha/year (16.88 of the total cost). It is followed by cost of manure, which was Rs. 4098.22 (15.39 percent of total cost) and seed Rs. 3253.38 (12.20 percent of total cost).

4. Economics of community fish farming in large ponds.

The average production of fish obtained from the LPA group was 1526.01 kg/ha. from LPB group 2144.10 kg/ha. from LPC group 2666.10 kg/ha and from LPD group 3185.10 kg/ha, show-

ing that production increased with increase in stocking sizes and stocking densities. The total returns obtained from LPA was Rs. 37,363.51/ha/year, Rs. 52,553.52, for LPB, Rs. 65,292.51/ha/year for LPC and Rs. 78,058.10/ha/year for LPD, with a net return of Rs. 16,297.48, Rs. 25,922.80, Rs. 37,843.97 and Rs. 46,609.85/ ha/year respectively, showing in increase in profitability with increase in stocking density.

It is observed that family labour income per year was Rs. 19,182.32, Rs. 28,880.54, Rs. 40,958.26, Rs. 50,004.16 and Rs. 34,756.32 for LPA, LPB, LPC, LPD and average respectively.

The input-output ratio is estimated to be 1.76. 1.98, 2.37 and 2.49 for each of the four groups respectively. The average cost of production was Rs. 13.80, Rs. 12.41, Rs. 10.94 and Rs. 9.88 per kg of fish for 1st, 2nd, 3rd and 4th groups respectively. These indicate that the cost of producing one kg of fish was cheaper with higher stocking density and bit stocking material (fingerling) compared to lower stocking density and small stocking material (fry).

III : Problems of CFF in the study area

Three blocks which were selected for the present investigation of Gonda district endowed with natural resources and human skills for taking up intensive fish culture, but the gap between actual and potential yield continues to persist. The new technology which seems technically feasible, has failed to pro-

duce substantial resutlts in the field condition.

For rapid dissemination of the technology, it is necessary to indentify the problems.

1. Problem as perceived by fish farmers in C.F.F. system.

"Non availability of credit" has been perceived by the fish farmers as the most important porblem (31.2 percent of the total weightage) in C.F.F. system. The second most important problem as perceived by the fish farmers was "lack of knowledge" (16.2 percent) in adopting the carp culture technology. "Erratic supply of quality fish seed" (15.2 percent) (especially exotic carps, viz. Silver carp, Grass carp and Common carp) at reasonable price and specific time poses a serious constraint in rural areas. Most of the farmers use fish seeds with the mixture of Catla, Rohu and Mrigal and small sized seeds (fry stage/early fry stage) collected from various hetcheries, are being directly stocked in ponds resulting in poor survival. This has been perceived as the third important problem (15.2 percent perceived by the farmers.

"High cost of inputs" (8.7%) and "low and fluctuating price of fish at farm gate" (7.6%) has been perceived as fourth and fifth problems in C.F.F. system.

"Poaching" (5.1%) was also considered a major inhibiting factor ranked sixth in position. "Lack of suitable organised market" (4.5 %), 'Non retention of water throughout the year' (4.1%), "Fish diseases" (4.1%) and "Poisoning of ponds" (3.5%) have

been perceived as common problem in C.F.F. system.

2. Analysis of problems with root cause in C.F.F. system.

The above ten problems are grouped into five sub-sections, viz :

(1) Financial constraints (39.8%) major problem in C.F.F. system. Main root cause are :

(i) The Banks require project prepared by the farmers, who are by and large uneducated and ill informed, and

(ii) The fish farmers are often landless daily wage labourers who have nothing to offer as security for loans.

(2) Extension gap (20.2 percent) ranked second in position. Extension of scientific methods to rural areas still remains large and inadequate. The main root causes are :

(i) The fish farmer is either inadequately trained without practical based training programme or not trained at all,

(ii) Multi-ownership and unwillingness hampers the acceptance of modern technology; and

(iii) Fish farmers are unaweare about fish diseases.

(3) The third most important constrains is availability of basic input/resources (19.4 percent). Root causes are :

(i) Lack of exotic carp seed hatcheries has compelled the

farmers in rural areas to resort to culture employing indigenous carps only;

(ii) Large ponds invariably have predatory fish population, the control of which is not feasible through de-watering of using fish toxicant since these ponds are mainly meant for multi-purpose use;

(iii) They are stocked with fry, the chance of survival of which is very meagre and consequently they do not yield much;

(iv) Most of the fish farmers used seed with the mixture of Catla, Rohu and mrigal because hetcheries supply the mixture seed; and

(v) Water level decline in ponds during summer months and most of the farmers use pond water for irrigation of different crops.

(4) The main marketing problems (11.8 percent) mentioned by the farmers were as fourth major problem. The root causes are :

(i) Lack of infrastructural facilities like cold storage, good approach roads from landing sites to marketing centres and quick transport; and

(ii) The fish markets are controlled by powerful groups of middlemen who buy from the producers at low price

at farm gate.

(5) In social constrainst (8.5%) poaching and poisoning. Organised dacoties have become a serious problem. Major cause of poaching is lack of proper monitoring. Economic competition among farmers is the root cause of poisoning of ponds.

3. Measures suggested by the fish farmers in increasing the yield of fish.

1. The fish farmers suggested "Provision of Credit" (29.15 percent) to purchase the necessary inputs as the prime requisite in the process of adoption of high yielding technology. The Banks or other financial Insititutions need to float liberal credit policies to support fish farmers in a big way.

2. More exposure to technology (25.10 percent) ranked second suggested measure. Knowledge regarding maintenance of ponds, hygiene and fish health care merits a special attention in making aquaculture a profitable venture . To gear up the fisheries extension services that we require not only strengthening by way of additional suitably trained manpower, but also regular provision of additional publicity material.

3. "Supply of good quality carp seed" (17.52%) for fish culture forms the third important priority measure suggested

by them. The finding underlines the need for producing more seed of exotic carps to fill the gap. Perhaps good quality carp seeds could be attained by training the farmers to rearing fry in their own nursery ponds.

4. Among the measures suggested by the fish farmers, "Marketing through organised sector" (15.84%). Organised arrangements for storage and marketing of fish are necessary and would be helpful in stabilising price structure to benefit both the producers and consumers. Efficient co-operative marketing organisations may minismise and ultimately do away the vicious circle of the middlemen. The fish farmers may take up the operation without any uncertainty associated with prices.

5. The fish farmers considered the control of poaching and poisoning of ponds as the fifth important measure favouring culture of fish. Social awareness and educating the villagers, especially the young force, might reduce the intensity of the problem.

V. B : CONCLUSIONS

Based on the findings, the following tentative conclusions were arrived at :

(a) Present status of community fish farming.

1. Most of the small ponds were seasonal and medium deep and canal fed.
2. Most of the large ponds were parential deep ponds and ground water and canal fed.
3. Majority of small fish farmers collect seed from local hatchery and majority of large fish farmers collect seed which are supplied from Ghaghra river.
4. Indian major carps (Catla, Rohu and Mrigal) were most popular stocking combination in C.F.F. system.
5. Both, small and large fish farmers, stocked their pond with fry and fingerling stage with different stocking density.
6. Majority of large fish farmers provide balanced locally available supplementary feed (Rice bran + Mustared oil cake). Most of the small fish farmers used rice bran/rice polish as supplementary feed.
7. Both, small and large fish farmers, prefered bag feeding method followed by broad casting method.
8. Both, small and large fish farmers, use feed below the rec-

ommended rate.

9. Cattle dung was popular pond manure for small and large fish farmers. Pig manure is totally absent in study area.

10. The community fish farmers use low amount of manure.

11. The maximum number of large fish farmers occasionally used lime in their pond in low amount than recommended dose.

12. Dragnets were commonly used by small and large fish farmers.

13. Most of the small farmers harvested their produce 1-2 times in a year whereas large fish farmers harvested fish more than 4 times.

(b) Personal profile.

1. Both, small and large fish farmers, were mostly middle age group people.

2. 'Mallah' caste were major caste among both small and large fish farmers.

3. Large fish farmers had more education than small fish farmers.

4. Majority of fish farmers had 5-10 years experience in community fish farming.

5. Majority cases of fish farming was supplementary occupation.

6. Majority of fish farmers were having land holding 0-4 ha.

7. Large fish farmers had small family than small fish farmers

8. Majority of small and large fish farmers had medium socio-economic status.

(c) Economics.

1. Variable cost accounts for more than 95% of the total cost while fixed cost constitutes merely 5% of the total cost, because all the fish farmers used land taken on lease.

2. Cost of feed and seed increased with stocking density.

3. Percentage of total cost of manures decreased with stocking density.

4. Cost of feed is a major share of the total cost, followed by the cost of seed.

5. Cost of producing one kg of fish was cheaper with higher stocking density and big stocking material (fingerlings) compared to the lower stocking density and small sized stockng material (fry).

6. Stocking size is bigger (fingerlings) and stocking density is high, profitability is also high.

(d) Problem in C.F.F. system.

1. Non availability of credit.

2. Lack of knowledge.

3. Erratic supply of quality seed.

4. High cost of inputs.

5. Low and flunctuating price at farm gate.

6. Poaching.

7. Lack of suitable organised market.

8. Non-retention of water throughout the year.

9. Fish diseases.

10. Poisoning.

(e) Measures suggested by fish farmers.

1. Provision of credit.

2. More exposure to technology.

3. Supply of good quality seed.

4. Marketing through organised sector.

5. Control of poaching and poisoning.

V. C : RECOMMENDATIONS

In the light of present findings, review of relevant literatures, investigations, own observations and experience, the following recommendations are put forth to minimise the gap between actual and potential yield of fish to enhance the revenue of fish farmers in C.F.F. system :

1. Advanced seed rearing techniques should be adopted for raising seed in nursery ponds. The spown and fry of commercially important varieties caught in river flood plain can be stocked in nurseries and rearing spaces where these fryes can be housed for better survival. They can be released later into the village community ponds.

2. Stocking density of 8,000 to 15,000 fingerlings/ha in composite fish culture system may be adopted. Stocking density is not the only factor, which affects the production of different stocking densities show that the potential of semi intensive fish farming with higher stockng densities in this study area, can be further improved by upgraded scientific culture methods.

3. Stocking of disease free and acclimatised healthy carp seeds should be adopted.

4. Good quality of water with rich oxygen content is recommended for culture of carp species.

5. The water should be made available at cheap rates through

canals in summer time.

6. Proper management practice should be adopted to prevent deterioration in pond water quality.

7. Application of lime should be adopted regularly during the culture period, so as to keep pH variation in pond water within the range of 7-7.5.

8. Using local fish food ingredients, an appropriate cost-effective diet has to be developed with better F.C.R. in order to make grow out operation economically viable.

9. Laying of emphasis on the prophylaxis of fish diseases as a preventive measure.

10. Fishing equipment should be made easily available from F.F.D.A.

11. Popularisation of integrated fish farming (fish-duck, fish-livestock, fish-poultry, fis-horticultural crop) to avoid economic risk.

12. Organising better marketing facilities and transport to the site can further enhance the income. The interferene of the middlemen regarding marketing should be minimised to help the fish farmers to get actual value of their work.

13. Creation of efficient post-harvest and marketing network with adequate hygienic facilities for storage and marketing to cover various centres of demand and to facilitate farmers to get remunerative prices for their produce.

14. A greater level of co-ordination is needed between the researcher and the field extension workers.

15. Well desined extension programme through different media are needed to the implemented to educate people on different aspects of fish farming practices.

16. Depending upon suitability of areas, training programmes needed to be organised to encourage adoption of carp culture by farmers. This will help in promoting awareness towards potential or carp culture.

17. Periodical training and motivation should be imparted to all the concerned by effective extension teaching methods, like field trips, demonstration, group discussion, meetings, drama and puppet-show etc.

18. The establishment of model fish farming demonstration unit to show results of new practices would be helpful in accelerating fish farming business.

19. The fisheries department should be established at the Block level for proper supervision.

20. The staff of fisheries department should visit the community ponds periodically to offer suitable suggestive about fish diseases and feeding of fish.

21. Bank employees should be kept under strict supervision.

22. Interest on bank loans should be reduced to encourage the fish farmers.

23. The procedure of obtaining loans and 'Petta' should be simplified. ❑

Chapter-VI

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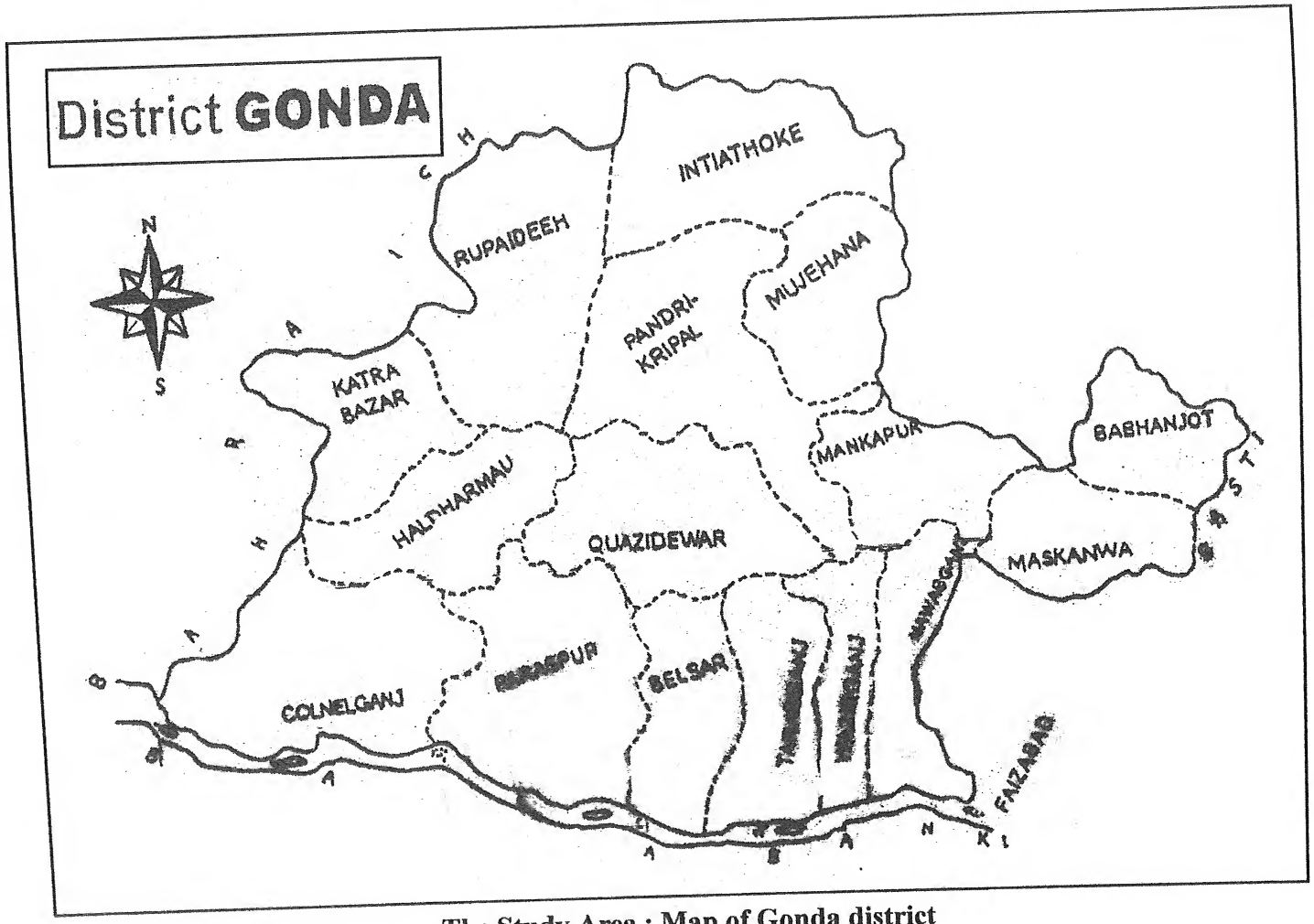
APPENDIX

Appendix-I



The Study Area : Map of Gonda district

Appendix-II

Schedules for the study on :

"Community Fish Farming System in Gonda district of U.P. with special reference to Economics and Problems.

Part-I. HOUSE HOLD SCHEDULE.

A. Identification of respondent

(a) i. Name of the respondent .....

ii. Father's name .....

iii. Village.....Block .....

iv. Sex.....Age.....Caste.....Marial Status.....

v. Literacy—

Illiterate	Can read & Write	Upto Primary	Upto High School	Upto Inter	Above Inter

vi. Trained in fish farming : .....Year

viii. Experience : .....

(b) Economic Status of fish farmers on the basis of :

Land holding

i. Marginal (less than 1 ha)

ii. Small (1 to below 2ha)

iii. Large (above 2 ha)

Pond size

i. Small (less than 1 ha)

ii. Medium (1 to below 2ha)

iii. Large (above 2 ha)

B. Details about the family and work force.

Male	Female	Children		T	Workers		Non-workers		Hired		Total	
		M	F		M	F	M	F	M	F	M	F

C. Socio-economic status.

Please supply the following information with regard to your socio-economic status :

1. Education :
   - (a) Illiterate (0)
   - (b) Upto Primary (1)
   - (c) Upto High School (2)
   - (d) Upto Intermediate (3)
   - (e) Upto Graduation (4)
   - (f) Graduation and above (5)

2. Social Participation :
   - (a) Member in none (0)
   - (b) Member in one organisation (1)
   - (c) Member in more than one organisation (2)
   - (d) Office Bearer (3)

3. Caste :
   - (a) Scheduled Caste and Scheduled Tribe (0)
   - (b) Backward Class (1)
   - (c) Higher Caste (2)
   - (d) Dominent Caste (3)

4. House :
   - (a) Thatched House (0)
   - (b) Kachcha House (1)
   - (c) Mixed House (2)
   - (d) Pucca House (3)

5. Size of the land holding :

(a) Less than 5 acres (0)

(b) Upto 10 acres (1)

(c) Upto 20 acres (2)

(d) Upto 40 acres (3)

(e) 40 acres and above (4)

6. Occupation :

(a) Farming and labour (0)

(b) Farming and caste occupation (1)

(c) Farming (2)

(d) Farming and services (3)

7. Farm Power :

(a) 1 - 2 Bullocks (0)

(b) 3 - 4 Bullocks (1)

(c) More than 5 Bullocks (2)

(d) Tractor (3)

8. Material Possessions :

(a) None (0)

(b) One farm animal (Bullock, Buffalo, Cow)/Bicycle /Fuirniture (1)

(c) Two farm animals/Bullock cart/Radio (2)

(d) Three to four farm animals/Improved farm/ Newspaper/Electricity (3)

(e) Five to ten farm animals (4)

(f) More than ten farm animals (5)

Part-II. TECHINICAL DETAILS REGARDING FISH FARMING

1. Details about the fishponds.

Area of pond and depth	Type of pond	Source of water	Year of construction	Renovation of pond (✓)	Partial development with boring
				(1) Removal of aquatic weed and wild fish (2) Repair of Bundhs	

2. Input supply pattern. (Seed Collection)

Riverine Collection (Rs./1000)	Collection from seed hatcheries (Rs./1000)	Supplied from Ghaghra (Rs./1000)

3. Stocking size and stocking density.

I.M.C.	Size	Density/ha	Exotic Carp	Size	Density/ha
1. Catla			1. Silver Carp		
2. Rohu			2. Grass Carp		
3. Mrigal			3. Common carp		

4. Level of major inputs applied.

i. Lime (kg/ha) .....

ii. Organic Manure (kg/ha)

a. Cattle dung .....

b. Pig Dung .....

c. Poultary manure .....

d. Duck dropping .....

iii. Fertilizer (kg/ha)

a. Urea .....

b. Murate of Potash .....

c. Super Phosphate .....

iv. Feed of fish :

a. Depend upon only Plankton (natural feed)

b. Supplementary feed

*Rice bran/Rice Polish .....

* Mustard oil cake +

Rice bran/rice polish .....

* Others .....

5. Types of net used for harvesting (✓).

(1) Gill net

(2) Cast net

(3) Drag net

(4) Traps

6. Total Harvesting in a year. .....

Part III. ECONOMICS OF COMMUNITY FISH FARMING

(A) Annual Expenditure.

Sl. No.	Particulars	Material			Labour		
		Qty.	Rate	Value	Qty	Rate	Value
i.	**Pre-stocking Mgt.**						
1.	Pond Drying						
2.	Weeding						
3.	Erradication of wild						
	fish						
4.	Repair & maintenance of bundh						
5.	Watering						
6.	Liming and pH test						
7.	Manuring						
ii.	**Stocking Management**						
1.	Fish seeds						
2.	Transport charges						
iii.	**Post stocking Mgt.**						
1.	Fish feed-oil cake rice bran/polish						
2.	Liming & pH test						
3.	Manuring						
4.	Fertilising						
5.	Fortnight netting						
6.	Harvesting						
iv.	**Marketing of fish :**						
1.	Transportation						
2.	Octroi						
3.	Marketing fee						
v.	**Lease charge**						
vi.	**Miscellaneous charges**						

(B) Inventory related to fish farming.

Sl. No.	Particulars	Qty	Date of Purchase	Beginning Inventory	Depri. Value	Ending Value	Remarks
(i)	Pump set						
(ii)	Procuring						
(iii)	Room						
(iv)	Boats						
(v)	Gears (Nets)						
(vi)	Trolleys						
(vii)	Others						

(C) Output.

a. Total Yield in whole years.

(D) Marketing of Carps.

Total Catch	Quantity retained for self consump-tion (kg)	Marketable surplus (kg)	Sale Price (Rs. per kg.)	Gross return (Rs.)

Part IV. PROBLEMS IN C.F.F. SYSTEM.

1. Please mention three major problems in fish farming and Rank them.

Sl. No.	Problem	Rank
1.	_____	_____
2.	_____	_____

3. _____

2. Please mention three major suggestive measures of these problems and Rank them.

Sl. No.	Problem	Rank
1.	_____	
2.	_____	
3.	_____	

Date : _____ Investigated by : _____

3. _____ _____

2. Please mention three major suggestive measures of these problems and Rank them.

Sl. No.	Problem	Rank
1.	_____	_____
2.	_____	_____
3.	_____	_____

Date : _____ Investigated by : _____

Appendix-III

Explanations of Photoplates.

Plate 1-A : Community Fish Farming in Large Ponds.
1-B : Captured Fishes during C.F.F.

Plate 2-A : C.F.F. in small ponds.
2-B : Fish farming by fish farmers.

Plate 3-A : Captured fishes for sale.
3-B : Fish market in the nearby area.

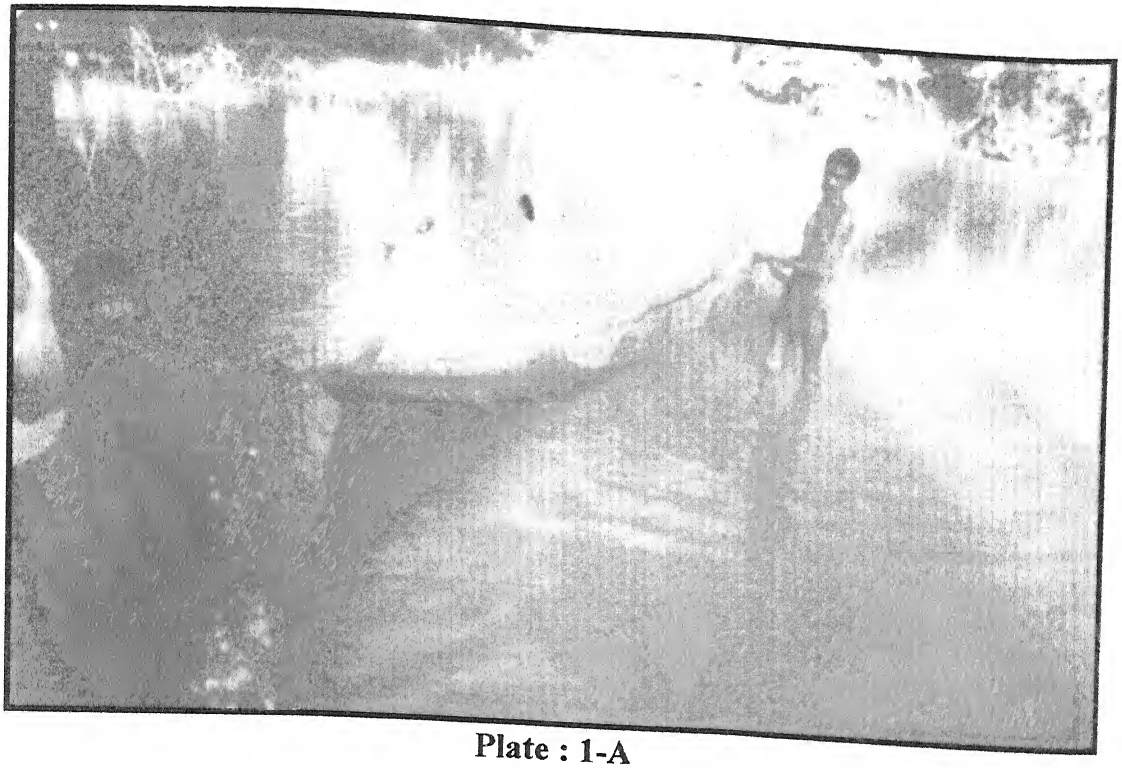


Plate : 1-A

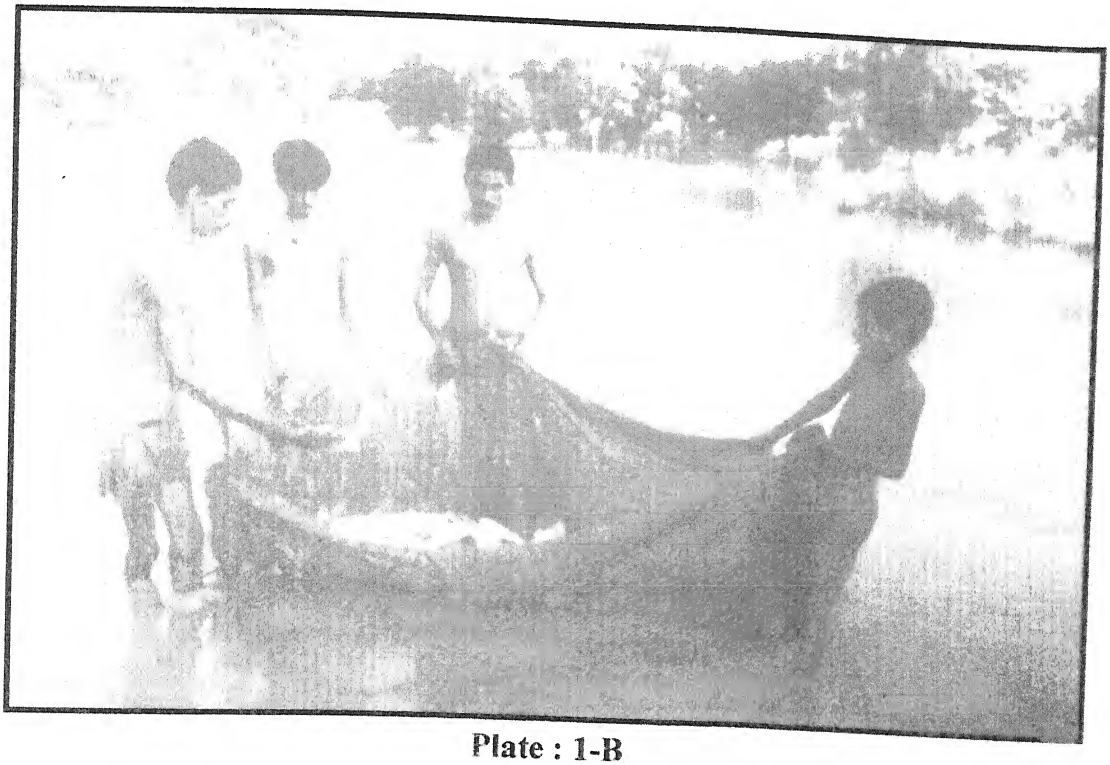


Plate : 1-B

Plate : 2-A

Plate : 2-B

Plate : 3-A

Plate : 3-B